

# American Artisan

Founded 1880

The Warm Air Heating and Sheet Metal Journal

Vol. 96, No. 4

CHICAGO, JULY 28, 1928

\$2.00 Per Year

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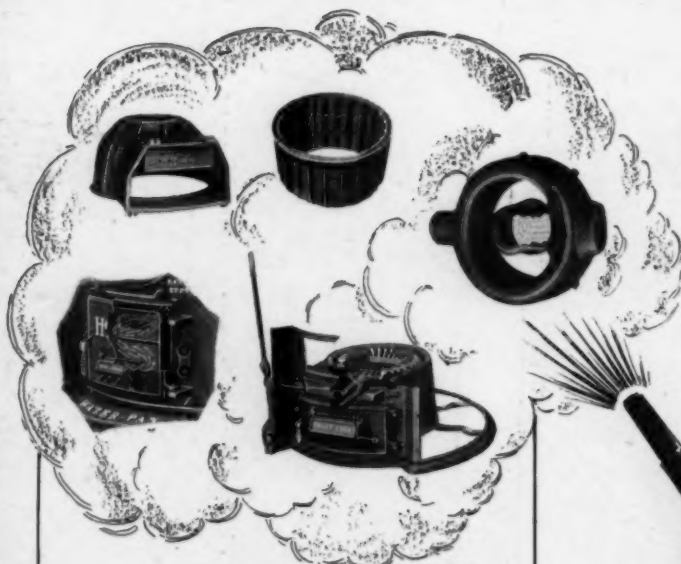
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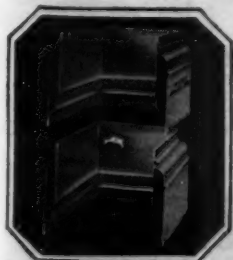
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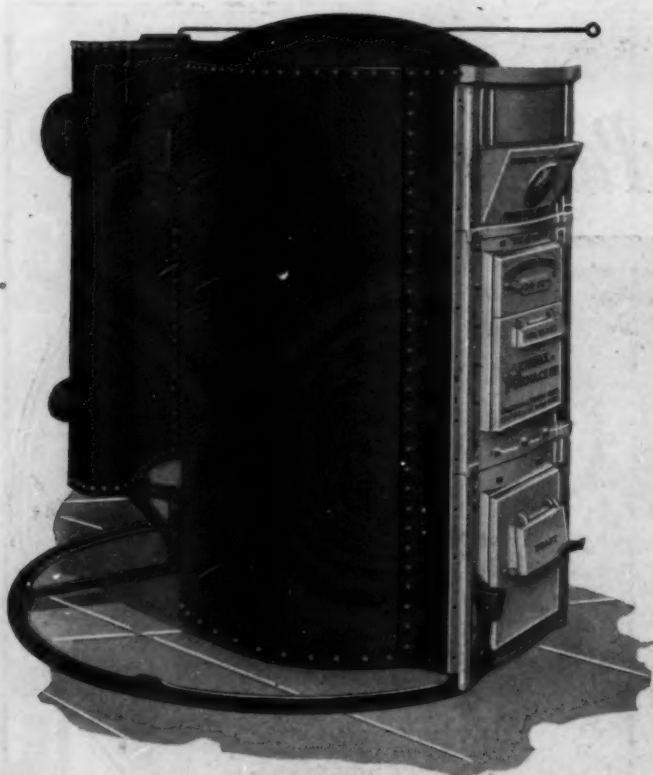


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Published Weekly by American Artisan and Hardware Record, Inc., 620 South Michigan Avenue, Chicago, Illinois. AMERICAN ARTISAN—the Warm Air Heating and Sheet Metal Journal—entered as second class matter, March 26, 1928, at the Post Office at Chicago, Illinois, under act of March 3, 1879. Formerly entered on June 25, 1887, as American Artisan and Hardware Record.





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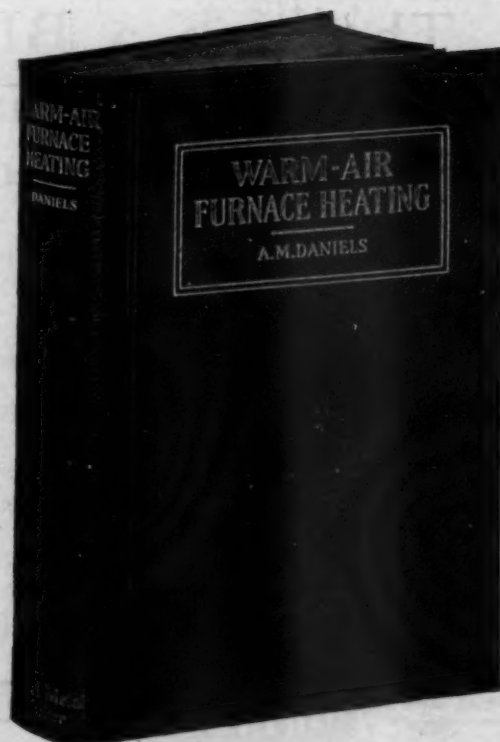
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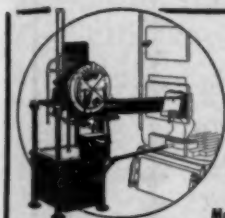
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*Mention AMERICAN ARTISAN in your reply—Thank you!*



Founded 1890

Published to Promote  
Better  
Warm Air Heating  
and  
Sheet Metal Work

# American Artisan

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## ADVERTISING AND EDITORIAL STAFF

Etta Cohn

Franklin Butler

G. J. Duerr

J. F. Johnson

Chas. E. Kennedy

Frank McElwain

Eastern Representatives: M. M. Dwinell, J. S. Lovingham, 156 Fifth Avenue, New York City

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### AN OPPORTUNITY

At the recent conventions of the National Association of Sheet Metal Contractors and of the National Warm Air Heating Association some very fine programs for carrying on the activities for betterment of the industries were promulgated. But it is not sufficient to expect committees to do all of the work. Every sheet metal contractor and warm air heating man should take it upon himself to offer his ideas and suggestions as to how best to work out these programs. AMERICAN ARTISAN gives you an opportunity to have your views aired. Let us have them. In this way they will come to the attention of the committee chairmen.



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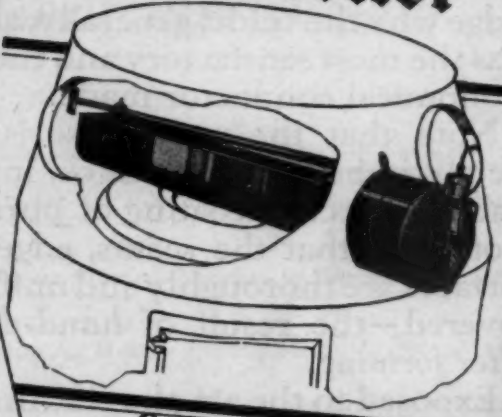
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# American Artisan

The Warm Air Heating and Sheet Metal Journal



Vol. 96

CHICAGO, JULY 28, 1928

No. 4

## Constructing Pattern for Hip Skylight Requires Considerable Study

*Thorough Knowledge of Geometry an Essential to Such Pattern Drafting*

By O. W. KOTHE, Principal St. Louis Technical Institute

**H**IP skylights require a complicated piece of geometrical laying out.

The accompanying plan, near the bottom of drawing, shows a hipped skylight made to a T design. Here we have hip bars, ridge bars, valley bars, common bars and jack bars. After a person practices enough on such work, many short cuts present themselves; but for a person not so well acquainted, it is better to spend a few moments longer, working by recognized methods rather than trying to memorize short cuts and spoil a lot of material by merely forgetting some of it.

In-skylight work we cannot make a  $\frac{1}{2}$  pitch bar do for  $\frac{1}{4}$  pitch, or merely throw the parts together. Some shops whittle out each bar on the job, which consumes ten times more labor than if cut out on the flat in the shop. Then, too, with increased fireproof construction, skylights must also be designed to resist fire. This is only done by securely riveting the bars, curbs and everything that aids in holding the structure together. Many shops merely tack the bars in lightly with solder. Even if soldered heavily and in case of fire, the flames always shoot up light walls, and before long the solder is melted and the entire frame work tumbles in like a deck of cards. This results when work is not riveted.

Most skylights of average size up to 8x12 feet or so are generally

made with the standard size bar, where the girth is  $7\frac{1}{4}$  inches, or where four strips are cut out of a 30-inch sheet of metal. Larger skylights should have stronger bars. It is the depth of a bar that gives strength—never the width. So shops making a wide, shallow bar have the wrong idea of strength.

*Continuous well planned advertising is the most successful method of increasing business. Advertising if wisely directed will build friends and create sales. Good advertising can be depended upon to do much of the missionary or advance sales work. This preliminary informative work can be effectually accomplished at much less expense through the medium of advertising than by salesmen. — W. W. Walsh.*

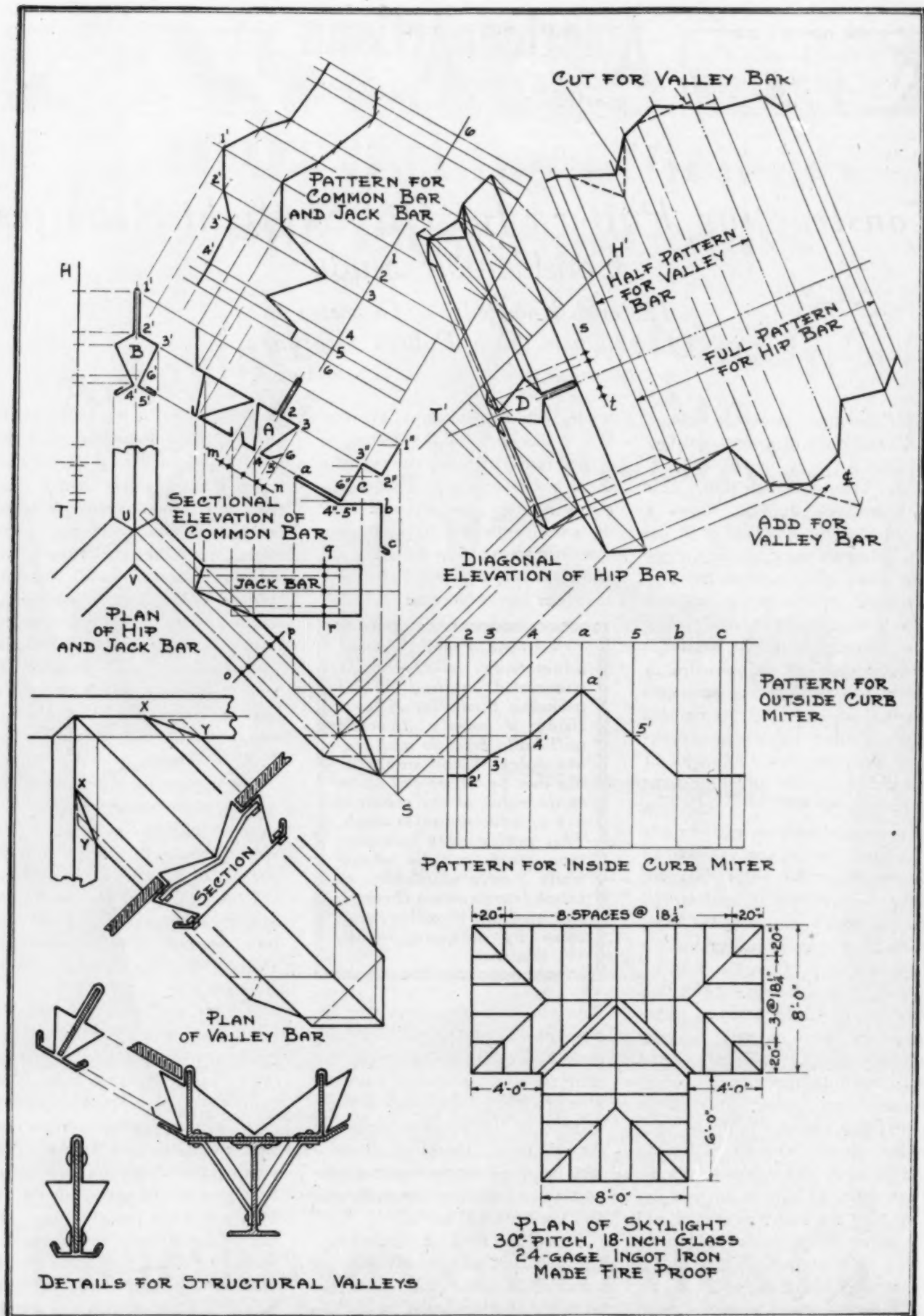
Bars with low fins allow for the glass to sag and crack, and the putty also cracks and crumbles out more readily. This causes leaks and a satisfactory job can never be made because of the incorrect design in the first place. Therefore, the common bar is really the basis of proportion; to its size the ridge bar and lower curb is made.

First draw the pitch line of skylight as 2' 2" of our sectional elevation. At some place detail the section A perpendicular to it. We should say the pitch of skylight can

be made  $\frac{1}{4}$  pitch,  $\frac{1}{3}$  to  $\frac{1}{2}$  pitch; but for convenience we generally make a  $\frac{1}{3}$  pitch to a 30 degree, which is slightly less than a third pitch, but is more convenient to lay out because of the 30-degree triangle. When the detail A is drawn, then draw lines from all points in the bar, as 1-2-3-4-5-6, parallel to the pitch line. At some convenient place detail the ridge bar B, and also the lower curb C, as shown. Observe the common bar A then intersects the ridge bar, as at 1'-2'-3', etc., and at the lower curb C at 1''-2''-3'', etc.

The pattern for the common bar can be easily projected from this elevation view, by picking the girth from A and setting it off at right angles to 2'-2''. Then draw stretchout lines and from each point in ridge B, also curb C, project lines into pattern. The intersections 1'-2'-3', etc., gives the pattern as shown.

But the hip bar requires considerable more work. For this we must use a part plan by drawing the hip line U-S to a 45-degree angle. Then by means of the ridge B and curb C drop lines to develop a plan view with mitre lines as shown. The width of the hip bar in plan is placed by means of the projection on line m-n, which are placed as o-p. By this means the lines are drawn parallel to U-S, and the mitre lines are filled in as shown. Now, since the plan is in a flat position and the elevation is in a foreshortened posi-



Patterns for Hip Skylights



tion for the hip, we must, therefore, develop a diagonal elevation.

### Constructing Diagonal Elevation

To do this we project all the intersections from ridge bar and the lower curb to the vertical line H-T. Observe, this places all the points in their true altitudinal position with relation to each other. Therefore, if we transfer this line with all its points to a line as H'-T' perpendicular to the plan hip line U-S, and projecting lines from mitre line at the ridge and the curb, we intersect those lines projected from line H'-T'. Observe, here we build the altitudinals into the plan projections, and the intersections thus made of similar numbers enable us to draw the mitre line of diagonal elevation. This view is in its true position, and if we take line m-n and transfer it as s-t, we can develop the true section D. This is then the bevel to which the hip bar must be bent, and it also gives the girth for developing the pattern.

There, at right angles, draw a line to the diagonal elevation, and on it transfer the girth for the section D. Draw stretchout lines so they are parallel to the diagonal elevation. Then from each point in the mitre lines of ridge and also curb project perpendicular lines to cut off lines in stretchout of similar character, and this enables drawing the mitre cut lines shown by the heavy outlines.

### Providing Outsides Mitres

The jack bar is the same as the common bar and, therefore, has the same pitch, only it mitres against the hip bar. Therefore, we draw the jack bar in plan, using m-n as q-r for establishing the widths. As the lines intersect the hip bar they make the mitre line shown. Now this mitre line is carried up into our sectional elevation as our lines indicate, and this shows the elevation mitre lines of the jack bar. The pattern for jack bar has the same girth as the common bar and, therefore, we can project this pattern right over the common bar pattern. This is shown by the inside heavy line.

Now the curb requires outside mitres and also inside mitres. So lines are dropped from curb C into line U-S of plan. Then from here a line as 2-c is drawn, and the girth from C is picked and set out as shown. Stretchout lines are dropped and from each intersection of curb C in line U-S of plan lines are carried over into stretchout. Where similar lines intersect as at 2'-3'-4'-a'-5', etc., join these points with lines and the pattern for curb is finished. The top portion is for an outside mitre pattern, while the lower portion that falls off is the inside mitre pattern.

This completes all our patterns for the skylight, with the exception of the valley bar. Now the valley bar is identical to a hip bar, only a gutter is added to give space for the water to run off. Then the glass shoulder is bent in a reverse angle from those in section D, otherwise the treatment is the same. Where a pattern is developed for a hip bar, it is a simple matter to use the same pattern for the valley bar. The glass shoulder requires a little longer cut, as x-y of plan, for valley bar, and this can be set in pattern for hip bar as the dotted lines indicate. At the bottom curb cut a similar mitre is used, and the valley gutter must be lengthened at the tip. These changes can be nicely made with a pair of dividers, so a separate development is not required.

The valley bar itself can be made similar as the section indicates, where a piece of strap iron is riveted to the glass shoulders and a bottom cap strip is riveted over the gutters of bars. The spread of the gutter proper in the valley can be made as the size of skylight may require. But ordinarily to have the full valley from  $2\frac{1}{2}$  to 3 inches wide is ample, since there is a considerable drop where the water can run off rapidly.

### Careful Planning Required for Good Results

Edges or lugs of sufficient length must be added to all these bar patterns, to enable fitting on flat places and to receive a rivet or two. This

requires careful planning and also good workmanship, since to put rivets in place which may not be secure is as bad as none at all. The purpose of using rivets in all straight members where rivets can be placed is as a protection to fire hazards. A well-riveted skylight should stand up and cover the opening even if the solder has melted. This is also why wire glass is used, so in case of fire, or glass cracking, the wire will support the broken pieces. Where a skylight falls to pieces during a fire, the circulation afforded by the open roof is tremendous, and when fire once receives then this encouragement, the building must be left go—like a leaky ship to sink.

On larger skylight work structural steel bars are often provided, and around these the sheet metal worker must wrap his metal. Near the bottom of plate we show the common practice of reinforcing skylight bars. If very long bars are used, a larger core iron bar is used and riveted, as shown at the lower detail. Where valley bars are of long span, an I-beam is often run with a steel plate supported by angle bar braces. On top angle bars are run and the sheet metal is wrapped around or set in place similar as we show.

The designs we show here are good, safe practices, and we, of course, realize that a dozen different men might work out a dozen different designs—some might be quite satisfactory, others might not be as good—but if tradesmen have no standard to measure by as good design and construction, it will be impossible for them to know absolutely if their design is good or not.

It is common knowledge that every farmer mechanic thinks himself about as good as he can get, simply because there is not enough men of higher caliber around him to inspire him, to point out his weakness, to show him better construction. It is a long established fact that where an unusual mechanic is employed in a shop the inspiration he gives others soon produces inquiries for further technical train-



ing. But if the Ace Mechanic is removed from them so his influence can no more inspire them, they sink back in their old rut of complacency.

Sheet metal design and drafting is the electric motor for the mechanic—it produces the current to keep the motor in motion, to give out inspiration and a higher service all around. It is not alone a blessing for the man himself, but also

for the shop that employs him and also for all his fellow workmen who have contact with him. A man who once has his talents lit up effectively cannot be closed down on so easily. But it is more likely this new power set in motion is the very one to give new hope and courage to many a forelorn and discouraged brother. Therefore, keep your drawing board busy; it is the only way to gain proficiency.

## Committee Appointments Made for National Sheet Metal Association

*Work of Industrial Betterment to Progress Without Interruption*

**P**RESIDENT PAUL L. BIER-SACH of the National Association of Sheet Metal Contractors announces the following committee appointments to carry on the work of the association during the 1928-29 year:

### Elected by the Board of Directors Contractor Publication Committee

George Harms, 1313 South Adams Street, Peoria, Ill.

George I. Ray, 311 East Fifth Street, Charlotte, N. C.

Louis Luckhardt, 800 Second Avenue, Pittsburgh, Pa.

### Finance Committee

George I. Ray.

H. J. Dettmers, Suite 208, 350 North Clark Street, Chicago.

Louis Luckhardt.

### Appointed by the President National Chamber of Commerce Committee

J. A. Pierpont, Washington, D. C.

Allied Construction Industries

H. J. Dettmers.

C. W. Panch, Racine, Wis.

J. A. Piper, Greenville, S. C.

Fred Hertel, Galveston, Tex.

### By-laws

J. E. Merrick, Louisville, Ky.

George I. Ray.

Paul L. Biersach, Milwaukee, Wis.

### Code of Ethics

H. J. Dettmers.

Peter Biegler, Chicago, Ill.

Wm. Schwartz, St. Louis, Mo.

### Inter-related National Associations

Charles N. Louis, Peoria, Ill.

P. H. Lenderking, Baltimore, Md.

M. F. Liebermann, Ambridge, Pa.

This is a new committee, President Biersach explained, and has powers to act in the association's interests with committees of a similar nature with other associations.

### Labor

W. F. Angermeyer, Pittsburgh, Pa.

H. L. Stanyer, Dallas, Texas.

H. T. Halverson, Portland, Me.

G. W. Frazier, Portland, Ore.

### Mooseheart Training Plan

H. J. Dettmers.

A. J. Wagner, Chicago.

A. B. Rysdon, Chicago.

### Overhead Expense Committee

Otto Geussenhainer, Sheboygan, Wis.

G. J. George, Springfield, Ill.

Samuel Warren, Erie, Pa.

Louis Rysdon.

W. R. Etie, Houston, Texas.

### Trade Relations and Policy

W. C. Markle, Pittsburgh, Pa.

J. M. Fox, Ensley, Ala.

C. C. Tolg, Waukesha, Wis.

Wm. Stechow, Cincinnati, Ohio.

Ernest Gichner, Washington, D. C.

### Uniform Mechanics' Lien Law

Otto Geussenhainer.

M. F. Liebermann.

Rodolph Jobst, Peoria, Ill.

Wm. Feiten, Cleveland, Ohio.

### Vocational Educational Committee

Louis Luckhardt.

R. C. Jeske, Milwaukee, Wis.

Max Walten, Washington, D. C.

R. S. Hahn, Easton, Pa.

F. I. Eynatten, Peoria, Ill.

E. O. Wood, Ft. Worth, Texas.

### Warm Air Furnace

E. H. Riesmeyer, Pittsburgh, Pa.

Guy A. Voorhees, Indianapolis, Ind.

E. B. Langenberg, St. Louis, Mo.

F. J. Hoersting, Dayton, Ohio.

Wm. G. Harms, Rock Island, Ill.

### Trade Development Committee, George Harms, Peoria, Ill., General Chairman

*Metal Cornices*—Louis Luckhardt; W. C. Markle, Pittsburgh;

Geo. Thesmacher, Cleveland, Ohio.

*Warm Air Furnaces*—E. B.

Langenberg, St. Louis, and George

Harms, Peoria.

*Skylights and Ventilators*—Paul

L. Biersach, Milwaukee; W. A.

Fingles, George Thesmacher.

*Blow Pipe and Exhaust System*—

Hugh Munro, Philadelphia, Pa.;

R. J. Blum, Cincinnati, Ohio; M. O.

Steinhorst, Utica, N. Y.

*Ventilating System*—J. J. Haines,

Chicago, Ill.; F. E. Treuchet,

Springfield, Mass.; J. C. Boehm,

Cleveland, Ohio.

*Hollow Metal Doors and Trim*—

Geo. Thesmacher, Cleveland, Ohio.

*Roofing Gutters, Conductors,*

*Flashings and Corrugated Iron*

*Work*—George I. Ray; J. E. Mer-

rick, Louisville, Ky.; W. H. Tin-

ney, Philadelphia, Pa.; F. Christen-

sen, Toledo, Ohio.

*Metal Ceilings*—W. A. Fingles,

W. C. Torrey, Boston, Mass.; H. T.

Klugel, North Emporia, Va.

*Restaurant, Kitchen and Hotel*

*Equipment*—J. E. Merrick; Warren

Brown, Cincinnati, Ohio; Paul Bar-

ger, Cleveland, Ohio.

*Fire Doors*—Paul L. Biersach;

Geo. Thesmacher; Edw. Hoffman,

Milwaukee, Wis.

*Metal Windows*—Paul Biersach;

O. A. Hoffman, Milwaukee, Wis.;

Thos. Shean, Chicago, Ill.; Emile

B. Bourleir, Louisville, Ky.

*Protective Coatings and Paints*—

W. C. Markle; W. A. Fingles;

O. E. Hutchison, Louisville, Ky.

# Copper as Viewed From Sheet Metal Contractor's Standpoint

## *What Copper and Brass Research Has Done for Sheet Metal Industry*

By L. C. LEIMKUEHLER\*

**I**F all builders and building owners knew sheet metal values as thoroughly as progressive sheet metal contractors do, probably 90 per cent of all sheet metal exposed work would be of copper. You, of the sheet metal industry are familiar with copper and the long, satisfactory service given by copper work when properly erected. Many a property owner has been benefited through following your suggestion that copper be used for the roofing, gutters, downspouts or flashings in his buildings. Possibly many others have paid the price for not following it.

Some of you, even by experience, know that payment of notes endorsed for the accommodation of friends often carries a penalty when taken for granted. The gun which wasn't loaded but killed its victim illustrates another phase—taking for granted that the gun wouldn't go off. The thought I want to discuss is the opposite—the necessity of not taking for granted that builders or building owners are loaded with information about the real values of your work; and that they are primed to respond intelligently to your suggestion that copper be used on their work.

Telling the public about the good work you do, the service given by your work, the advantages of quality materials and workmanship and all the other things about you, your business, the sheet metal industry, and the materials available—that is a big job and an endless one. Perhaps at some time you have asked yourself, "What good or what help do I get from the advertising of the

Copper and Brass Research Association advertising?" Well, your story—the story of the sheet metal work must be told and retold to the public if you get the share of business that is merited by the class and type of work which you do. Our advertising helps to tell that story—your story. The part we do makes the part you do more effective. Still in spite of the thousands upon thousands of excellent copper jobs, and all your helpful recommendations and all the literature and information published by the Copper and Brass Research Association and its member companies, the public is not fully informed about copper—and we do harm to the public and ourselves when we assume that they are.

Of course, that is the dark side. All of us have to go on talking and publishing and passing information along—but the good work done by you and the work done by us is reflected in the progress of the sheet metal industry, the improved character of sheet metal work and the ever-increasing use of copper.

### **Copper Dome at Jackson, Miss., Endures 90 Years**

Back in 1837 at Jackson, Miss., the old state capitol building was erected. Both wings and dome were roofed with copper. In 1903 a new capitol building was erected and the old one left to stand alone—deserted but still sheltered and dignified by its crown of copper. During the ten years which followed the copper was removed from the wings. In 1917 the old capitol building was rehabilitated by modernizing its interior. Some changes and repairs to the exterior were necessary but the old dome stands intact with its original beauty still graced by the copper roof which has sheltered

it for over 90 years.

Very likely less than half the inhabitants of Jackson know that the old capitol building in their midst has a copper-covered dome. A few may know its history. And that brings the thought—"How many know about your ability to do good work and the good jobs which should eternally be to your credit? Do the owners of buildings, on which your work has given fifteen or twenty years of excellent service, appreciate, as they should, the high quality and effectiveness of your workmanship?"

Your copper jobs are giving that sort of service. Many of the neighbors observe it. But the owner, after the first few years—satisfied that the service is good—often takes too much for granted and your skill, ability and honest workmanship are not given a fair value in his mind. The road is then wide open for curbstone contractors. They get jobs from these owners on the basis of price regardless of quality.

Link up the necessity of constantly reminding your customers about the quality of your workmanship, the service given by your jobs and the work of the Copper and Brass Research Association and you will see that our work is helping every high-class sheet metal contractor. Our literature brings the facts about copper to many thousands of owners each year. It directs their thoughts to quality and real worth. That builds appreciation for both copper and the skill and honesty which you put into erecting it.

All of this is reflected by the increasing use of copper. In the Midwest, as in all other sections of the country, sheet metal contractors quickly grasped the importance of

\*Address by L. C. Leimkuehler, Midwest Office Copper & Brass Research Association. Delivered at convention of Missouri Sheet Metal Contractors' Association at Kansas City, July 24.



copper as a factor in the progress of the industry and as a means of keeping in step with the trend toward better buildings. The evidence is everywhere in the larger number of copper gutters, roofs, downspouts and flashings.

#### **Copper Store Fronts Coming Into Vogue**

More recently sheet copper for store fronts has become one of the important uses. In many Mid-Western towns and cities it is not uncommon to see several copper store fronts in each of the principal business blocks. Wherever progressive sheet metal contractors have caught the possibilities of copper for the purpose, big strides are being made because copper is particularly adaptable, relatively low in cost and, properly erected, makes a permanent job. Too, it is a class of work where skill is worthy of its hire and is profitable to the sheet metal contractor.

Marquees, canopies, and roofs of copper on the better buildings are likewise evidences of the sheet metal industry's progress: progress because it is aimed at man's most expensive enemy—decay; when expressed in terms of metal—rust. And rust is the finish and end of all corrodible sheet metal work.

Copper doesn't rust. Every copper job is, therefore, an effective stroke in the battle against rust. Still the rust bill of this country is well over \$600,000,000 per year. That is a rather definite index of the opportunity to build a bigger and better sheet metal industry because average American citizens are beginning to look that rust bill in the face. Likewise those citizens are learning that the rusting of corrodible metals is as sure as taxes—that paint isn't the cheapest nor only means of escape.

Much more might be said along this line, but you gentlemen are familiar with most of it. So I want merely to assure you again that our Association is anxious to work closely with you. Our manager, W. A. Willis, views the needs of your industry in a big, broad way. Although our funds have been and are

limited, we have done much which we feel has been advantageous for you. However, instead of crowing about that, we want to do other and bigger things for you. In whatever good we have accomplished you have played your part. We recognize that your efforts have been helpful. We want you to know that we appreciate them.

#### **What Bureau of Standards Tests Proved**

In 1925 a series of tests and experiments to determine proper methods of laying copper roofs; values of seams and fastenings; effects of expansion and contraction and other similar data, was started at the Bureau of Standards at Washington, D. C., at the suggestion of and in part directed and financed by the Copper and Brass Research Association. In 1927, the findings and conclusions drawn from completed parts of the tests were given by John F. Gowen, secretary of our association, before many associations of sheet metal contractors. As is common to work of this sort, it roused the interest, helpful criticism and suggestions of sheet metal contractors. The result was that more tests and experiments were started, at your suggestion, at the Bureau of Standards. They are still being carried on. Final results and findings will be delayed perhaps for another two years. When completed they should be a most valuable contribution to the sheet metal industry. In all probability they will be better because of the helpful suggestions by sheet metal contractors.

On technical literature has been prepared with utmost care and thoroughness. For the sheet metal industry it represents a compilation of the best thought and experience of many competent sheet metal contractors. Within the pages of the copper flashing book and the copper roofing manual you will find a truly valuable combination of theory and actual practice—a combination made possible by the generous help of highly skilled sheet metal contractors and artisans. Our part was more that of getting and developing the idea. Most of the information was

supplied by members of the sheet metal industry.

But—we did compile and publish the information in booklet form. We did distribute thousands of copies of it free to architects, builders and sheet metal contractors.

Over 200,000,000 copies of newspapers, class, trade and technical publications carried our messages about copper and copper products to the public during the early months of this year. That was our spring advertising campaign. Another is being prepared for the fall months. Through them countless thousands have and will obtain much information about the splendid value of copper work.

For your immediate convenience the Mid-Western office was opened in St. Louis. We want you to feel that it is there to help you to any information you may need about copper, brass or bronze. It is there to help you in every way it can. We shall be glad to get your requests for help or your suggestions as to how we can more effectively help.

Our Building Service Department receives thousands of actual sales leads annually from every section of the United States. Any sheet metal contractor in this country can have the sales leads pertaining to copper roofing materials from his city and territory without cost.

All of these inquiries for copper roofing materials are sent out each night to your national headquarters at 336 Fourth Avenue, Pittsburgh, Pa. Any sheet metal contractors in the country can obtain the leads from his city or territory by writing to your headquarters. You will find many of these leads will bring you business.

One could go on thus, indefinitely, but the principle is too well understood to need elaboration. The Copper and Brass Research Association is one for mutual benefit; not alone, however, to its members, but to all branches of industry where its metals are used. It is to be conceded that its legitimate purpose, its reason for existence, is to promote the use of copper and copper alloys.



# Gas Furnaces to Be Economical Must Be Built of Sheet Metal

*Cannot Obtain 100 Per Cent Efficiency from Gas Fuel*

By J. A. MARTIN

THE writer has read with great interest the answer by Ed. Jones of his recent criticisms of the sheet metal gas furnace vs. cast iron for gas-fired furnaces.

Now that he and I also know that without judges a debate is never ended, therefore let my readers judge for themselves and draw their own conclusions.

The writer holds no malice in his heart against any legitimate and honest furnace man or firm whether he builds his furnaces out of cast iron, sheet metal, or what-not, just as long as he will uphold the standard of warm air heating, but the writer is partial to sheet steel furnaces because of the following reasons.

I have been connected with the Phillips Heating, Ventilating & Manufacturing Company for the past 26 years, which company is the oldest exclusive heating firm west of the Rocky Mountains. I have managed this company since 1920. We are not quite as old as the Mueller Furnace Company, but the writer has had personal contact with the heating business that only few men gather in their entire lifetime. I am proud of this fact and feel that blowing my own horn is justifiable. I also believe that Dan Payne of the Payne Furnace & Supply Company of Beverly Hills, California, is the only other man in the community who has had anywhere near my experience in this neck of the woods. They also build a line of sheet metal furnaces that are shipped, as I understand it, all over the United States and they place a substantial time guarantee on their furnaces.

The writer is looked upon as one of the leaders in his territory, which embraces practically all of California, north and south; Arizona, Ne-

vada, Utah, and parts of Texas, and his decisions in this matter are not altogether based on theory; also his conclusions are not based wholly on sunny, salubrious Southern California's climate.

## Element of Corrosion Greater in West

But heating in this wonderful climate is not quite as easy as Mr. Jones intimates, owing to the fact that homes here are heated every morning and evening, and if condensation is present in our furnaces, they surely would rot out here more quickly than where the fire is con-

oooooooooooooooooooooooooooo  
 o **Mr. Martin was recently** o  
 o **elected for the third con-** o  
 o **secutive term to the** o  
 o **presidency of the Gas** o  
 o **Association of Southern** o  
 o **California. He is also the** o  
 o **proprietor of the Phillips** o  
 o **Heating, Ventilating and** o  
 o **Manufacturing Company,** o  
 o **Los Angeles, California.** o  
 ooooooooooooooooooooooooooooo

tinuous. One year's operation in Southern California climate is worse than several years' use in colder climates where there is a continuous fire. But the writer's gas furnaces have also had the effects of a continuous fire in commercial work where the fire was continuous for twenty-four hours a day and these furnaces were used for five years before repairs were necessary, and then out of 550 tubes it was only necessary to replace 18. Now remember that these tubes and furnaces were built of 25 gauge black steel, *no special alloy irons being used.*

I quite agree with Mr. Jones that our mixed gas, which is a thing of the past, was practically free from sulphur in Los Angeles; however,

there is considerable at the present time, owing to the fact that our natural gas is brought directly from the wells to the consumer. But there may be a few places in the United States that do have bad gas, in which case it would not make much difference whether the furnaces were built of cast iron or heavy steel; they would certainly deteriorate faster than with the more ideal gas.

## B.t.u. Has Same Value World Over

But I do take exception to Mr. Jones' ideas that the standards of operation in one climate cannot be used in another climate, if the furnaces are properly rated, because a B.t.u. has the same value in America as it has in China, and why should it differ? A B.t.u. is a standard the world over, the same as weights and measurements. Gas, or any other furnaces, certainly must be rated for the climate in which they are used, whether the temperature in that particular climate is 30 degrees below, 30 degrees above, or anywhere in between.

The writer has gained a great deal of practical experience from the time he pitched the first forkful of straw into a steam separator engine, or poked wood, or shoveled coal, or controlled the flow of crude oil into a locomotive firebox, or burned gas in a steam stationary boiler or in a gas furnace. A B.t.u. is a B.t.u. the world over, whether it is produced from one fuel or another.

It is true, and Mr. Jones is right, in regards to the gas fuel containing a large percent of hydrogen which forms water when combustion takes place and with sulphur mixed with it when condensation takes place. But why allow condensation to take place? Why fight

it? Why not fight fire with fire and get rid of the stuff? That is what the vent pipe is for, whether it is a pound of water or a ton of lead; that is the purpose of the vent pipe. The percentage of weight in solid fuel in sulphur, water, soot, ashes, etc., is a great deal more than in gas and this all passes out the smoke pipe in solid fuel furnaces except the ashes, which are shoveled out of the ash pit. Just because gas is a perfect fuel, don't think for one minute you can obtain 100 per cent efficiency out of it. It cannot be done. And yet that is what most gas furnace manufacturers are trying to do. Condensation can be entirely eliminated by proper conditioning of the combustion and the drafts. When drains or drip pipes are used to draw off the condensation, efficiency is also running out the same spout, in addition to the deterioration of the furnace—it makes no difference whether it is cast iron or sheet metal.

#### Design of Furnace Particular

I believe that if cast iron could be cast the same *thickness* as the sheet metal and be fired under the same conditions as the sheet metal, the sheet metal would outlast the cast iron a good many times, but owing to the impracticability of casting cast iron as thin as sheet metal, we know that that is out of the question. We also know that, owing to the thickness of cast iron, it certainly should stand up longer, but the efficiency of the furnace would not be effective as quickly as sheet steel, therefore causing a waste of gas.

I also agree with Mr. Jones that there is a great deal of energy stored up in a flywheel, but that is used on an engine to balance up the power, but as we do not need flywheels on gas furnaces, why hold or store up the energy? Why not release it to be used where it is most needed as soon as possible after combustion takes place.

If the heating plant is properly proportioned and of adequate size and the job properly installed, there should be no cold air drafts over the floors from either first or second floor registers. The writer has cor-

rected a good many heating jobs where there were cold drafts occasioned, as Mr. Jones suggests in his article. I believe that the trouble in these cases lies with the man designing the heating plant.

#### Rigid Inspection Enforced in Los Angeles

Mr. Jones asserts that the American Gas Association requirements and the Los Angeles City is merely a step in the right direction. It is the greatest stride forward in furnace work that has ever happened, especially in Los Angeles, where strict inspection and upholding of the law has been pushed to the limit, and we expect to see even better work than at the present time.

When you understand that the inspectors go out with rules and tape measures and have definite practical laws to enforce, it is easy to understand how furnace work must be installed properly. It seems to me that Mr. Jones is not altogether familiar with the furnace work as it has been done in the past in Los Angeles. The new requirements offer to the people of Los Angeles the best that science and practical experience has to offer. The new ordinance and the Blue Star approval has created in furnace work here the greatest strides that could be imagined or comprehended.

We have a heating inspector in Los Angeles who has nothing else to do but inspect heating jobs, and he is rather prone to see that all work is done according to the law. If work is found to be not right, it must come out and be done over.

#### SPOT NEWS

The John McMahon Auto Sheet Metal Works has been chartered in Portland, Ore., with a capital of \$5,000, by John McMahon, Harley McMahon and Alverta McMahon.

The Wyman Sheet Metal & Furnace Works has been incorporated in Seattle, Wash., with a capital stock of \$5,000 by H. W. Wyman and Thomas C. Walsh.

The Wynkoop Brothers Company has been incorporated in Portland, Ore., to engage in the roofing and sheet metal business, by H. A.

Wynkoop, S. H. Wynkoop and Lillian Wynkoop, with a capital stock of \$10,000.

The American Cornice Works, 237 North Water Street, Wichita, Kan., has been awarded the sheet metal contract for \$15,000 residence of Roy Buckley.

The Western Sheet Metal Works, 450 North Main Street, Wichita, Kan., has been awarded the sheet metal contract for residence of H. L. Tuggle.

The G. H. Kidwell Tin Shop, 2525 East Harvey Street, Wichita, Kan., has been awarded the sheet metal work for residence of L. Garner.

The Drummond Metal Manufacturing Company, 144 North Emporia Street, Wichita, Kansas, has been awarded the sheet metal work for residence of Ed. Cranze.

Carlson Brothers, 1216 Banks Avenue, Superior, Wisconsin, have been awarded the roofing and sheet metal contract for J. J. Newberry Company store in that city.

The Hovland Sheet Metal Works, Eau Claire, Wisconsin, has been awarded sheet metal contracts on residences of C. H. Bergman Company and James McDonald in that city.

Bruns Brothers, 1309 Pierce Street, Sioux City, Iowa, have been awarded furnace heating contract for residence of L. W. Lichty.

B. H. Steffen & Company, Chico, California, have been awarded the roofing and sheet metal work contract for school building in that city.

George W. Weiser and J. C. Weiser have engaged in business at 2718 East Florence Avenue, Walnut Park, California, as Florence Sheet Metal Works.

The West Coast Sheet Metal & Roofing Company has been incorporated in Tampa, Florida, by Oscar Worrell, 705 Azeele Street, and others.

The C. F. Shuman Roofing Company, East Boulevard, Charlotte, North Carolina, has been awarded the sheet metal and roofing contract for R. J. Reynolds Tobacco Company \$2,000,000 office building in Winston-Salem, North Carolina.





United States Mint, New Orleans, La. Cornerstone laid 1835 and completed 1838. Roof still covered with original sheets.

## Galvanized Iron Protects Gold

**“W**HAT a beau you are! How I admire you!”

With that bantering and facetious compliment did Bernard Marigny, scion of early Louisiana's most illustrious family, hector his bosom friend, Monsieur Tissier, afterward a prominent judge but at that time a popular dandy. Marigny delighted in nothing better than thus to quiz his friend. He carried it on persistently for many months and Tissier bore it good-naturedly. But one evening at a party and in the presence of ladies, Tissier took heated exception to the oft-repeated jibe and a challenge ensued. The following morning at dawn the two erstwhile dear friends and boon companions faced each other at “The Oaks,” New Orleans' famous old duelling ground. There they stood facing each other, the flower of Creole aristocracy, and both with everything to live for yet neither afraid to die for honor. Presently Marigny threw up his arms and laughingly exclaimed, “What a beau you are! How I admire you!” with

### *Original Sheet Metal Roof Still on Old New Orleans Mint After Ninety-Two Years of Service*

By C. L. BAILEY

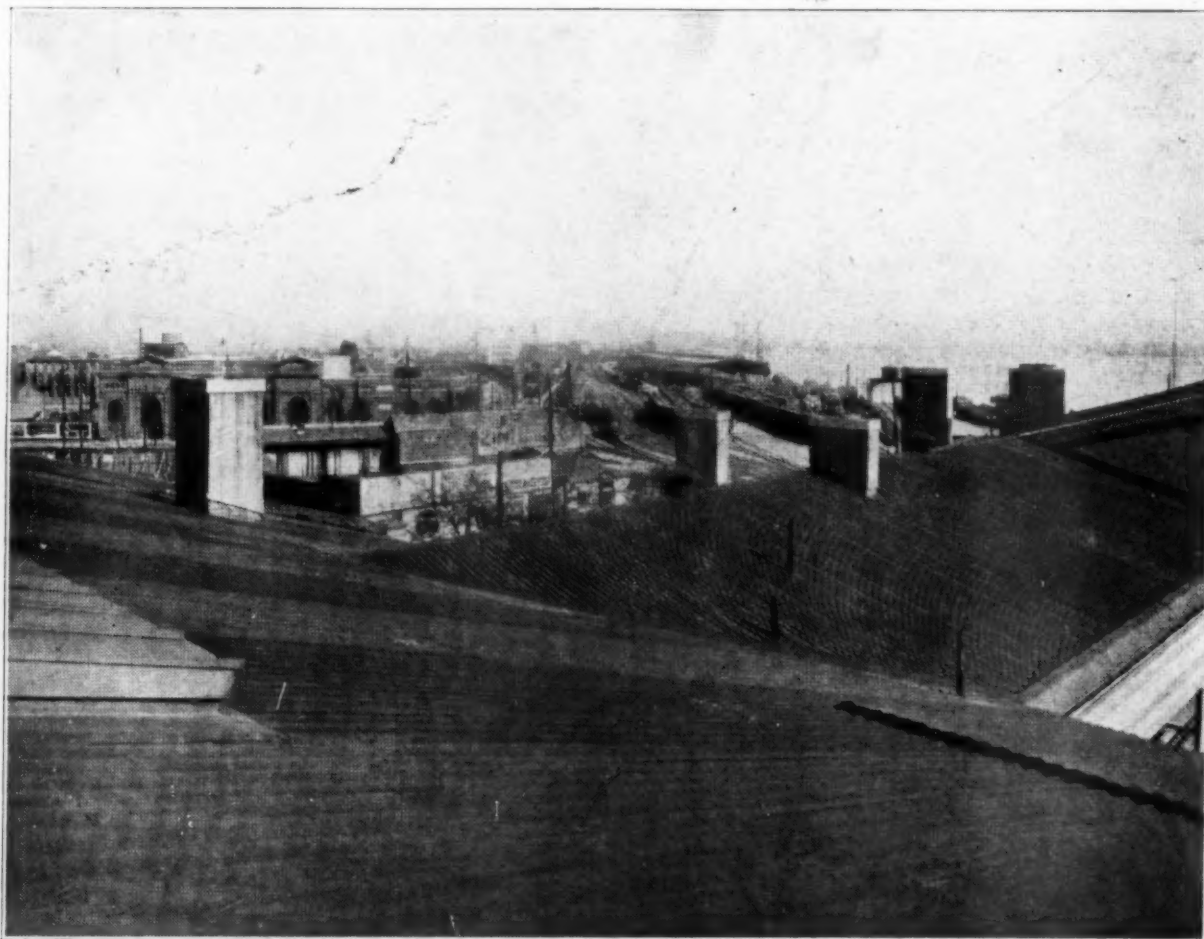
such ludicrous effect that Tissier's sense of humor also responded, with the result that they left the duelling ground arm in arm.

Such were the people and such were the customs of the early nineteenth century in Louisiana. New Orleans at this period had only recently come under the flag of the United States. The old, brave, romantic Creole regime still flourished and New Orleans was a place of romance and gaiety—a town the like of which was not to be found anywhere else. A bit of old France

and Spain intermingled with New World customs and conditions.

Among all the names of all the pirates of any period, there is none which stands out more significant of romance and adventure than that of Lafitte. In old New Orleans the Lafitte brothers, Jean and Pierre, had their blacksmith shop, for they were blacksmiths when they were not pirates, on Chartres Street, and the old shop survived until early in the period of which is written here. In that early day morals and motives were not examined too closely nor were too many questions asked. If one preserved one's “honor” intact, one might be acceptable even in the best society. So it was with the brothers Lafitte.

It was in 1827 that the first street procession of masqueraders was held in New Orleans. Those were the days when the young sons of wealthy families must needs be sent to France for an education and several of these young men just returned from Paris started the movement which has since come to mean



View of Mint roof showing railroad yards with glimpse of city in background at left and Mississippi River at right.

so much to New Orleans and which is now called "Mardi Gras," an annual frolic and jollification which draws visitors from all parts of America to this day.

Such, briefly, was the time in which the subject of this brief story had its beginnings. Many years have come and gone, and the people and manners of that stately era have long since vanished.

Today, in Esplanade Avenue, near the Mississippi, stands a massive structure, the United States Mint, a building whose history runs back into that old period. It occupies the site of old Fort San Carlos, which guarded the new city in the wilderness at its northeastern angle. Here, during the times just mentioned, stood the fort, and its cannon looked out over the river; here ran the moat, filled with water; and here hung the drawbridge, which gave to

the young New Orleans the appearance of a very ancient city, wholly out of place in the New World. Here, on a parapet of the fort, Andrew Jackson stood and reviewed the little army that was ready to go down to Chalmette and to victory. The fort fell into decay, and in 1821 it was dismantled. In 1835 the city conveyed the ground to the United States for the construction of a mint, with the proviso that if the site should ever be used for other purposes it should revert to the city. This stipulation was afterwards removed, however. The structure was completed in 1838 at a cost of more than three million dollars—a huge building, 828 feet long by 108 feet in depth.

The roof, which contains approximately 400 squares, is of 20 gauge galvanized sheets and is in excellent condition today even though it has

been in service for 92 years! The material is 5-inch corrugated and is strapped to purlins, the straps being riveted to the sheets. The purlins are 30 inches apart. The location of the building is such as is conventionally regarded as bad for sheet steel. It is near a railroad station where 22 passenger trains go in and out every day; besides, many freight trains and switch engines are busy there constantly. It is also near the river where dampness is pronounced and where a ferry landing necessitates the constant passing to and fro of boats on the Mississippi. The original ventilators, shown in the photographs, are steel. They were installed at the time the sheets were put on the roof and were made of 18 gauge black sheets. The roofing sheets are riveted at both ends and sides and lapped one corrugation. Also there is a lap of about 4 inches



at the ends.

For many years large quantities of coin were turned out here, and the tiny "O" beneath the head of the virgin Liberty bears testimony of the origin of the coins the New Orleans mint sent on their journey through the world.

One of the interesting stories in connection with this old building is that of the great ball that was given here years before the war by the out-going director of the mint, who wished to have a dazzling social close to his *regime* as mint master. Mrs. Eliza Ripley, an old citizen of New Orleans, gave an invaluable account of that ball; of the men and women who attended it, and of their subsequent histories. Never, surely, was a ball given in such a place or amid such surroundings.

During the Civil War and up to 1878, specie coinage here was suspended. Afterwards when the coinage was started again it was cut down a little more every year until finally it ceased altogether; the coins

deposited there were removed and the mint ceased to be a mint. For several years the building has been standing idle.

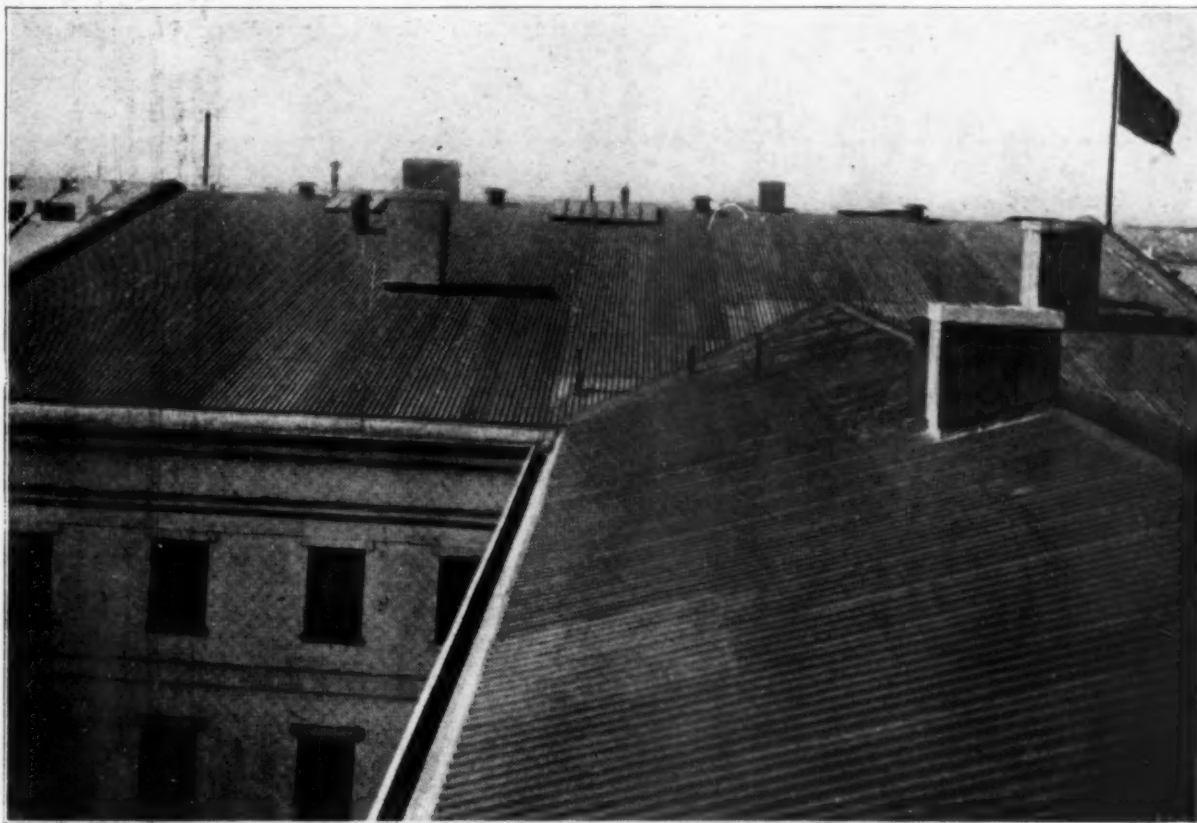
All of the foregoing data was taken from records on file and from literature of the *Times-Picayune* of New Orleans, and is authenticated by Mr. Leonard Magruder, Assayer in Charge of the New Orleans Mint since 1881. Mr. Magruder also is authority for the statement that William Strickland was the architect and Martin Gordon was the superintendent of construction of the Mint.

To the reader and to the rest of us who are familiar with the long-service potentialities of sheet steel this does not seem like an astonishing record. The New Orleans Mint roof sheets are no more a superior material than the sheets which are being rolled today. Nor is the Mint at New Orleans an isolated example of long service of sheet steel. In New England and other early settled parts of the country are to be

found similar instances where roofs covered with sheets of similar character have given service for generations.

It is hoped, therefore, that in the daily discussions of sheet steel into which all of us in the industry must enter, the staunch old roof of the United States Mint at New Orleans dating back as it does to the old Creole days of almost a century ago, will be used as an example of the inherent ability of sheet steel to serve for long periods.

The cornerstone of the building was laid in 1835, and the building was completed in 1838 at a cost of \$182,000 without equipment. The building itself is 282 feet long, and the various wings are 50x82 feet. The roof was made of 19-gauge galvanized iron. It was painted on an average of every 15 years. Five years ago the wind blew part of the roof off and this had to be replaced. The original ventilators were constructed of 18-gauge black iron.—*Making Markets.*



This photograph gives an excellent idea of the splendid condition of the corrugated sheets and ventilators which have been in service 92 years.

## Associated Sheet Metal Employers of Chicago Enjoy Sykes Week-End Party

*Motor to Oconomowoc, Wisconsin, Where They Were Guests of Mr. and Mrs. A. L. Sykes*

By GEORGE DUERR

**A**MONG the many excellent qualities of the members of the Associated Sheet Metal Employers of Chicago, their ability and willingness to enjoy themselves stands out most prominently. They may be keen competitors in business, but when it comes time to play they surely know how to fraternize with the best of them. This they proved at the National Association of Sheet Metal Contractors' Cleveland convention, attending as they did with the largest delegation present. They proved it again on Saturday, July 14, when, together with the Ladies' Auxiliary and children, they went en masse by automobile to the summer home at Lac La Belle, Oconomowoc, Wisconsin, of Mr. and Mrs. Aubrey L. Sykes and their four honest-to-goodness boys, Aubrey, Byron, Heatin and little Quintin, where they spent the week-end bathing, boating, rambling through the spacious wooded lawns that surround the place and add to its



Photo by A. B. Ryndon

**Spacious Lawn in Front of the Sykes Summer Home Where Dinner Was Served. The Lake Is to the Left**

charm and beauty. Mr. Sykes operates the Sykes Sheet Metal Works of 6036 South State Street, Chicago.

The program, as described by Al-

bert J. Wagner, Chairman of the Committee on Arrangements, began with the assembly of the members in their automobiles at Niles, Illinois, Touhy and Milwaukee Avenues, at 10 a. m. All members had been previously advised of the route to be taken, so that in case any one of the party had to drop out on account of tire trouble, he could easily find the party again.

At 11:30 a. m. the party started, Albert J. Wagner, with Mrs. Wagner, their son, Albert J. Jr., and daughter, Alice, in their speedy Chrysler, leading the way, their first stop being Lake Geneva. It might be said parenthetically that it was well that the speed cops were inactive that morning or there most certainly would have been some tall explaining to do, because Mr. Wagner sure did "lead the way with a capital L."

At Walworth, Wisconsin, the party stopped at the Wayside Inn where arrangements had been made



Photo by A. B. Ryndon

**Lac La Belle, Near Oconomowoc, Wisconsin, in Whose Cool Waters the Associated Sheet Metal Employers Disported Themselves to Their Great Enjoyment**



for a chicken dinner. Then on to Oconomowoc, where reservations at the Majestic Hotel had been made for the party.

Arriving at their destination, the party, 37 in all, found waiting to bid them welcome their host and hostess, Mr. and Mrs. Aubrey L. Sykes and their four boys, the beautiful summer home with its spacious

Saturday evening dinner was served on the lawns, and midnight luncheon was served Saturday night. Everyone had a good time and for the simple reason that nothing had been omitted that would make everyone have a good time. Sunday morning each guest breakfasted where he pleased and then returned to the Sykes home, where the day

William E. Glatt; Mr. and Mrs. Kalmon Hirsch; Mr. and Mrs. John Maier; Mr. and Mrs. James H. Rowley; A. B. Rysdon; Mr. and Mrs. Louis S. Rysdon, their daughter Ruth, and son Louis; Mr. and Mrs. W. Schwartz, Mr. and Mrs. Hans Starr and their two daughters; Mr. and Mrs. Albert J. Wagner, their daughter Alice, and son Albert J. Jr.; Mr. and Mrs. W. J. Larkins, Mr. and Mrs. L. V. Berghoefer and their friend; A. Durr, O. Williams, and Tom Shean. Just why there were no pictures taken of the men I am not informed, but I have a very fertile imagination which serves me very well.

#### Joseph T. Ryerson & Son Issue New Small Tools Catalog

Joseph T. Ryerson & Son, Inc., Chicago, has issued a new 272-page catalog on Ryerson metal working small tools and machinery. The book, which is completely indexed, making reference simple, contains a complete list of the small tools and machinery which can be obtained from that firm, giving price lists and descriptive information on these products.

In addition to the main catalog there is issued by the company a supplemental price list mailed out whenever any changes in the prices as listed in the catalog occur. A copy of this catalog and the latest supplement will be sent to anyone upon request. It will pay you to write at once.

#### David Lupton's Sons Co. to Have Chicago Plant and Warehouse

David Lupton's Sons Co., Philadelphia, manufacturer of steel windows, has made a contract with the Clearing Industrial district, Chicago, for the first unit of a manufacturing plant and warehouse. The plant ultimately will occupy 6½ acres. The first unit, already authorized, will be 150 x 500 feet on a tract of 93,881 square feet. The plant will be expanded later to 300 x 1000 feet. Demand from the middle west will be served from this middle west plant.



Photo by A. B. Rysdon

Lower Row, Left to Right—Mrs. W. Schwartz, Mrs. Albert J. Wagner, Mrs. Aubrey L. Sykes (the Hostess), Mrs. Louis S. Rysdon, Mrs. John Maier, Mrs. Kalman Hirsch, Mrs. James H. Rowley. Top Row, Left to Right—Mrs. Hans Staar, Mrs. Fred S. Bremer, Mrs. Harry J. Dettmers, Mrs. William E. Glatt, Mrs. Clark, Mrs. W. J. Larkins, Mrs. L. V. Berghoefer and Mrs. Berghoefer's Friend. Seated on the Grass—Elaine Starr and Her Sister

verandas, its broad scenic terraced and wooded lawns which unfolded gracefully to the shores of the sky-blue and peaceful Lac La Belle, a motor boat, a canoe and several sail boats all ready to contribute their utmost to the enjoyment of the happy guests. Captain James H. Rowley and First Mate Heatin Sykes took command of the fleet. The canoe was kept busy by the younger Dettmers, Rysdons and Wagners, and the following Monday many complaints of sunburn were heard. Here everyone threw care to the winds. Even Punctilious President Harry J. Dettmers and Mrs. Dettmers were not by any means the last of those to don their bathing suits and get into the water for a soothing dip.

was spent in outdoor enjoyment. Sunday dinner was served on tables set out on the lawns overlooking the lake. The party returned to Chicago Sunday evening, but no attempt had been made to keep them together because of the congested traffic.

The high score men in the horse-shoe games (barnyard golf) were Louis S. Rysdon, A. B. Rysdon, William E. Glatt, W. Schwartz, Albert J. Wagner, John Maier, while the flagpole experts were Berghoefer, Rowley and Shean.

Those in attendance at the outing were:

Mr. and Mrs. Harry J. Dettmers, their daughter, Dona, and her friend, Mr. Gaston; Mr. and Mrs. Fred S. Bremer; Mr. and Mrs.

**San Antonio, Texas,  
Ladies' Auxiliary  
Stepping Right Along**

The San Antonio Ladies' Auxiliary to the Sheet Metal Contractors' Association entertained with a swimming party and picnic at Terrell Wells, July 25th.

On August 10th Mr. and Mrs. W. J. Bowers will entertain the Sheet Metal Contractors of San Antonio and their friends and families with an ice cream supper. A lively program has been arranged.

Alex Hart, city salesman for Peden Iron & Steel Company, is in the P. & S. Hospital at San Antonio. Mr. Hart was taken ill while on his vacation, which he was spending with his family and a number of friends on Devils River, near Del Rio. He was rushed home and operated on for appendicitis. He is still quite ill.

At McQueeney, Texas, the Sheet Metal Contractors of San Antonio entertained with a picnic on the banks of the beautiful Guadalupe river, in the shade of large pecan trees recently. It was indeed an ideal place. Harry Dean was there with his motor boat and made many excursions up and down the river to the delight of all who accompanied him, while Mr. W. J. Bowers and several went fishing.

At noon, barbecued meats of all kinds, hot dogs, and all the fixings that make a picnic worthwhile, together with ice cold lemonade and several other kinds of bottled drinks was served by a very proficient committee to a very hungry crowd, who did due justice to the wonderful lunch.

In the afternoon a number of games were played, beginning with a popularity contest which was won by Mrs. Harry Dean, with Mrs. W. J. Bowers a close second. Mrs. Dean received a pair of electric curling irons.

The first race was a sack race of fifty yards, won by Mr. Frank Bowers, who received a steel tape. R. M. Parker was second and received a package of rivets.

The egg and spoon race for ladies was won by Mrs. Harry Dean. The

prize was a thermos bottle. The distance was twenty-five yards.

The boys' race of twenty-five yards was a sack race. Robert Angel was the lucky boy and received a fishing reel.

The fourth race was a men's race of fifty yards, a three-legged race. In this race Harry Dean and Aubry Sands won first prize. Mr. Dean received a riveting hammer; Aubry received a pair of pliers.

J. O. Walsh and Alex Hart were close behind them, winning second prize, each receiving a package of metal screws.

The skipping race of fifty yards for big girls was next. In this race Miss Lucille Moran won a beautiful kodak.

A fifty-yard dash for boys was next. Philipp McGuire came in ahead, with Robert Angel a close second. Philipp received a Boy Scout knife, while Robert was presented with a fishing reel.

Little Miss Marjorie Walsh carried off the next prize, a pair of roller skates. Marjorie won this prize by reaching home base first in a twenty-five yard race for little girls.

Aubry Sands and Frank Dean won the next race of fifty yards. Aubry received a complete set of socket wrenches, first prize, while Frank carried off a package of rivets as second prize.

The last race was a relay race with partners, the ladies starting from one end of the track while the men (their partners) started from the other end. This game caused lots of confusion and merriment in locating the right partner and winning the race. R. M. Parker and daughter, Miss Lois, were the first to reach the goal, winning first prize. Mr. Parker was presented with a pair of shears and Miss Lois received a beautiful flower vase.

A drawing was the last but not the least contest. J. O. Walsh drew a pair of tinner's shears and Mr. Taliaferro drew a pair of soldering irons. Miss Effie Slaughter received an electric fan for the attendance prize.

Music was furnished throughout

the day by a victrola with all the late selections, to whom all were indebted to W. H. Taliaferro.

J. O. Walsh proved himself to be a very apt camera man by taking several moving pictures.

All voted this picnic the best ever, and those who signed up for next year as well as this year were as follows:

Mr. and Mrs. Alex Hart and son, Mr. and Mrs. Joe Moran, Mr. and Mrs. Joe Dean and daughter Miss Kathryn, Mr. and Mrs. A. W. Garrels, Mr. and Mrs. J. O. Walsh, Mr. and Mrs. R. M. Parker, Mr. and Mrs. Harry Dean, Mr. and Mrs. Frank M. Bowers, Mr. and Mrs. O. R. Sands, Mr. and Mrs. W. H. Taliaferro, Mr. and Mrs. Geo. Kuhlman, Mr. and Mrs. Robt. Campbell, Mr. Henry Spaltenstein, Mr. and Mrs. W. J. Bowers, Mrs. A. Kruger, Mrs. H. Schuele, Mrs. R. Smith, Mr. W. H. Davis, Mr. Philipp McGuire, Misses Kathleen Howard, Ruth Taliaferro, Lucille Moran, Lois Parker, Doris Taliaferro, Dorothy Sullivan, Louise Walsh, Edna Jean Goar, Marjorie Walsh, Barbara Kuhlman, Effie Slaughter, Otys Simpson, Iris Daugherty, Mrs. T. P. Walsh, Mrs. Dan Sullivan, Messrs. Robert Angel, Raymond Dean, Aubry Sands, Frank Dean, Mr. and Mrs. C. F. Bonn, Mr. and Mrs. Harry Boyd, Mr. and Mrs. Max Goot, and Master George Kuhlman, Jr.

**Milwaukee Sheet Metal  
Contractors Will Picnic  
at Mequon, August 8**

The annual stag picnic of the Master Sheet Metal Contractors' Association of Milwaukee will be held at Knepel's Grove, Mequon, Wisconsin, on August 8. A cordial welcome is extended to all sheet metal contractors who care to attend.

The same committee on entertainment that handled the affair so successfully last will have charge again this year. Dinner will be served at 12 and there will be plenty of games, music, eats and drinks, according to a statement issued by Secretary W. A. Belau.



## Random Notes and Sketches

By Sidney Arnold

*"The essence of humor is sensibility; warm, tender fellow-feeling with all forms of existence."—Carlyle.*

I had the pleasure on Tuesday evening of this week of a most enjoyable visit with Mr. and Mrs. Albert J. Wagner and their son and charming daughter, Albert J. Jr. and Alice, at their spacious and beautiful apartment in Rogers Park which overlooks one of Chicago's many parks and playgrounds, with its trees, gardens, winding paths and lagoons. Mr. Wagner's apartment, however, is equipped with its own swimming pool which is available to the occupants of the building the whole year and is delightfully exclusive. Mr. Wagner is somewhat of a hunter and collector of relics. One of his many treasures is a glass cabinet filled with stuffed birds and animals, the fruits of his hunting expeditions. The relics are in the form of stones and old coins picked up on his travels over the country, one of these in particular being a fossilized beetle of a pre-historic age imbedded in rock and itself turned to stone. Mr. Wagner also brought out some AMERICAN ARTISANS dating back to 1894 and containing contributions of his, all of which were very interesting. Mr. and Mrs. Wagner are indeed very delightful in the role of host and hostess and our visit with them was most enjoyable.

\* \* \*

W. R. Haines, proprietor of the Ames Furnace & Tin Shop, Ames, Iowa, and his son, Roger, came in to pay us a visit on Tuesday of this week. Their trip to Chicago, in which they were accompanied by Mrs. Haines, is a part of a 10-day vacation which they are enjoying. Before coming to Chicago they had stopped at Elgin and Aurora, Illinois. Young Roger Haines is a wide awake boy who doesn't miss much that is going on around him. He came in the office and wanted to know immediately who that "bird" Sidney Arnold was. There are a lot of my readers that are going to

be passing through Chicago this summer on their vacation, and I hope they will take the opportunity of dropping in on their way. The pleasure of meeting them personally always hands me a big "kick" and I enjoy it.

\* \* \*

### Page Harry J. Dettmers and His Fire Fighting Apparatus

Said the architect to the builder,  
with a large and chesty sigh,  
"I'd like to give this job to you, but  
Holy Gee, you're high!"  
"Oh! Never mind," the builder  
said, "I'll take it anyway,  
I'll cut off ten thousand bucks and  
make the subs pay."  
The subs came flocking 'round the  
job like flies around a pie,  
But all the builder said to them was,  
"Holy Gee, you're high!"  
He took their hide, he picked their  
bones, and scraped their carcass  
dry.  
They found the money, brains and  
skill; he found the air and sky.  
And when they got all through the  
job, they owed him ten per cent,  
For hauling rubbish, watchman's  
fees, and su-per-in-tend-ent.

\* \* \*

### Politico-grams

Tom Pearson, of Western Steel Products Company, familiarly known as Von Dunkelspiel, says: "Tammany taught New Yorkers to dance that Hylan fling; now it's trying to teach the rest of the country to dance to 'East Side, West Side, Al Around the Town.' The hardy pioneers came with rifles, plows and axes; the gang politicians followed with elections, graft, and taxes. The dries have not yet got John Barley-cornered."

\* \* \*

"But, surely," urged Fred Goodall, "seeing is believing."  
"Not necessarily," replied Ed Stahler, his partner. "For instance, I see you every day."

### This Sounds Like a Razzberry

The oft repeated cry of "Help! Help!" reminds me of the story of Harvey Manny, Robinson Furnace Company, who was severely reprimanding a young man employe. When he finished the young man said, "Don't be so hard on me, boss, I'm only a young man trying to get ahead," to which the boss replied, "Well, you sure need one."

\* \* \*

### General Pershing Couldn't Have Used Better Strategy

"Darling," he cried, "I will lay my fortune at your feet."  
"But you've hardly got any money," she whispered.  
"No, dear, but what I have will look large beside those tiny feet of yours."

\* \* \*

He (poet lover): "My fair one, you reign supreme in my heart. Without you all would be dark and dreary. When the clouds gather and the snow and hail beat upon me, then I think of you. Then come the warm southern winds—the storms break, and through the dying showers I see your love shining bright and clear. My rainbow!"

She (materialistic factory girl): "Hey, is this a weather report or a proposal?"

\* \* \*

Miss Virginia Hutchison: "Have you much room in your new flat?"

Miss Mary O'Leary: "Mercy, no! My kitchen and dining room are so small I have to use condensed milk."

\* \* \*

A sheet metal man in Michigan wrote to Behler and Young, jobbers in Grand Rapids, ordering a carload of merchandise. The firm wired him:

"Cannot ship your order until the last consignment is paid for."

"Unable to wait so long," telegraphed the customer. "Cancel the order."

\* \* \*

Materialist: "There ain't no hell."  
Fundamentalist: "The hell there ain't!"

# Calculating Frictional Resistance at Different Velocities in Hot Blast Heating

## Number of Elbows and Length of Duct Must Be Known

By T. W. TORR\*

### Chapter V Frictional Resistance in the System

**T**O figure the resistance to the flow of air through the ducts we must first know the length of the duct. We will take, as an example, the building for which the velocity and volume was figured in Chapter IV. The building was 100 x 50 x 15. We will assume there is 65 feet of straight length of pipe. To this must be added the lengths of pipe that will have equal resistance to the elbows that are used.

Velocity plays an important part in the resistance an elbow will offer to the flow. As we deal mostly in comparatively low velocities the following will be adequate.

The radius of the throat as compared with the diameter of the pipe will offer the same resistance as a certain number of diameters expressed in straight lengths of pipe.

In our example let us assume there will be three elbows all of which will be in the 31" pipe and the throat radius will be 1½ times the diameter of the pipe. Each elbow will, therefore, offer the same resistance as six diameters in length of pipe. The 31" pipe is within a small fraction of 2.5 feet in diameter. 6x2.5 = 15 feet which will offer equal frictional resistance to one elbow as above described. As there are three elbows we have 45 feet to add to the 65 feet of straight pipe or a total of 110 feet.

Radius of throat of elbow in diameters of pipe...	¼	½	¾	1	1¼	1½	1¾	2
Number of diameters of straight pipe offering equivalent resistance..	67	30	16	10	7.5	6	5	4.3

The resistance to the flow is figured on the basis of the length of

Heating Engineer Rudy Furnace Co.

the longest run and the diameter of the opening at the end of the run and the velocity of the air.

Our duct is 110 feet long, 14" or 1.1 feet in diameter and the velocity is 500 f.p.m. The formula for figuring the frictional resistance in a duct in inches of water gauge is:

$$F = \frac{.0275 \times L \times VP}{D}$$

Where F = frictional resistance, or as it is generally called static pressure. (S. P.)

.0275 = A constant arrived at by test and actual experience.

L = Length of duct in feet.

D = Width of duct in feet.

VP = Velocity pressure.

(Air Velocity)<sup>2</sup>

$$VP = \frac{(4263)}{(4263)}$$

Air at 140 degrees at a velocity of 4,263 feet per minute will give 1" water gauge velocity pressure. Pressure varies as velocity squared.

We must first find the velocity pressure. Using the V. P. formula we have:

$$\frac{(500)^2}{(4263)} = .013689 \text{ or } .014 \text{ the velocity pressure}$$

$$F = \frac{.0275 \times 110 \times .014}{1.17} = .04619 \text{ or } .046$$

F = .046 inches water gauge, the resistance to the flow in the duct. Inches water gauge can be converted into ounces by multiplying by 1.73. To this must be added the

¾" or .4. Therefore, the total pressure against the flow will be .446, or approximately ½".

The total volume of air which is to be delivered through the complete duct system is, in this case, 4,000 c.f.m., and this volume will meet a resistance in the complete system of ½" water gauge, for total frictional resistance.

The fan selected must be one that will handle 4,000 c.f.m. against ½" pressure at a speed which will permit the fan to operate, as near as possible at its most efficient point.

### Chapter VI Transposing from Round to Rectangular Ducts

It will simplify the calculation of a duct system to lay it out first as a round pipe system. This can be done on a preliminary sketch. It is easier to figure the resistance in a round duct than in a rectangular one. The round duct system can be converted into a rectangular system for equal frictional resistance by the use of the conversion table presented herewith.

The table is used as follows: The row of figures across the top and the column at the extreme left can be used as the width or depth of the duct, according to the row in which this dimension is located.

Let us determine our ducts are to be 14" deep and we want to find the other dimension for a rectangular duct that will have the same frictional resistance as a 20" round pipe.

Having located 14 in the row of figures at the top of the table follow down the column immediately under 14 until you come to 20, then straight across to the left to the figure in the column at the extreme left and read 24.

A 14" x 24" rectangular duct will

resistance in the fan connection to the casing and in the casing. We find from experience this is about



have the same frictional resistance and carrying capacity as a 20" round pipe. All dimensions must be in either feet or inches.

When installing a fan job it is necessary that the plans be accurately followed in detail; otherwise failure will result according to the extent the plans have been changed.

Remember that the heat losses have been accurately figured. The correct volume of air at the required temperature to restore the heat losses has been estimated, as has been the frictional resistance in the system. Changing the size of pipes, varying the radius of elbows will increase or decrease the flow of air and affect the resistance against

the fan. The result will vary from fair to bad according to the extent of the deviation from the plans.

The fan produces the flow of air through the system. The temperature of the air is raised or lowered according to the combustion rate. If the system is designed for an outlet temperature of 140 degrees the combustion rate will have to be high enough to produce this temperature in the volume of air that is circulated.

We take care that the combustion rate to accomplish this result will not result in over-firing the furnace.

As the temperature outside rises and it is desired to reduce the room temperature, do so by lowering the

combustion rate (checking the furnace). This will reduce the temperature of the air being circulated through the system and less heat will be carried with it into the space to be heated. Do not attempt to control the room temperature by shutting off the fan or reducing its speed. Keep the fan running. To lower the temperature in the building reduce the combustion rate by checking the furnace. This saves fuel and preserves the castings.

#### Transposing from Round to Rectangular Ducts

The circular equivalents of rectangular ducts for equal friction are shown below.

Sides Rect. Duct	5	6	7	8	9	10	11	12	13	14	15	16	17	18
8	6.9	7.6	8.2	8.8										
9	7.3	8.0	8.7	9.3	9.9									
10	7.7	8.4	9.2	9.8	10.4	11.0								
11	8.0	8.8	9.6	10.2	10.9	11.5	12.1							
12	8.3	9.2	10.0	10.7	11.4	12.0	12.6	13.2						
13	8.7	9.6	10.4	11.1	11.8	12.5	13.1	13.7	14.3					
14	8.9	9.9	10.8	11.5	12.3	12.9	13.6	14.3	14.9	15.4				
15	9.2	10.2	11.1	11.9	12.7	13.4	14.1	14.7	15.3	16.0	16.5			
16	9.5	10.5	11.4	12.3	13.1	13.8	14.5	15.2	15.8	16.5	17.1	17.6		
17	9.8	10.8	11.8	12.6	13.5	14.2	15.0	15.7	16.3	17.0	17.6	18.2	18.7	
18	10.0	11.1	12.1	13.0	13.8	14.6	15.4	16.1	16.8	17.4	18.1	18.7	19.2	19.8
19	10.3	11.4	12.4	13.3	14.2	15.0	15.8	16.5	17.2	17.9	18.6	19.2	19.8	20.4
20	10.5	11.6	12.7	13.6	14.5	15.4	16.2	17.0	17.6	18.4	19.0	19.7	20.3	20.9
22	11.0	12.1	13.2	14.2	15.2	16.1	16.9	17.8	18.5	19.2	19.9	20.6	21.3	21.9
24	11.4	12.6	13.8	14.8	15.8	16.8	17.6	18.5	19.3	20.0	20.8	21.5	22.2	22.8
26	11.8	13.1	14.3	15.4	16.4	17.3	18.3	19.2	20.0	20.8	21.6	22.3	23.0	23.8
28	12.2	13.5	14.8	15.9	17.0	18.0	19.0	19.8	20.7	21.5	22.4	23.1	23.9	24.6
30	12.6	13.9	15.2	16.4	17.5	18.5	19.5	20.5	21.4	22.2	23.1	23.9	24.7	25.4
32	12.9	14.3	15.6	16.9	18.0	19.1	20.1	21.1	22.0	22.9	23.8	24.6	25.4	26.2
34	13.2	14.7	16.1	17.3	18.5	19.6	20.7	21.6	22.6	23.5	24.4	25.3	26.2	26.9
36	13.6	15.1	16.4	17.7	19.0	20.1	21.2	22.2	23.2	24.2	25.1	26.0	26.8	27.7
38	13.9	15.4	16.8	18.2	19.4	20.6	21.7	22.8	23.8	24.8	25.8	26.7	27.5	28.4
40	14.3	15.7	17.2	18.6	19.8	21.1	22.2	23.2	24.4	25.4	26.4	27.3	28.2	29.1
42	14.5	16.1	17.6	19.0	20.3	21.6	22.7	23.8	24.9	25.9	26.9	27.9	28.8	29.8
44	14.8	16.4	18.0	19.4	20.7	22.0	23.1	24.3	25.4	26.5	27.5	28.5	29.5	30.3
46	15.1	16.7	18.4	19.8	21.1	22.4	23.6	24.8	25.9	27.0	28.1	29.1	30.1	31.0
48	15.4	17.0	18.7	20.1	21.5	22.8	24.1	25.2	26.4	27.5	28.6	29.6	30.5	31.6
50	15.7	17.3	19.0	20.4	21.9	23.2	24.5	25.7	26.9	28.0	29.2	30.3	31.3	32.2
52	15.9	17.6	19.2	20.8	22.2	23.6	24.9	26.2	27.4	28.5	29.6	30.7	31.8	32.9
54	16.1	17.9	19.6	21.1	22.6	24.0	25.3	26.6	27.8	29.0	30.1	31.2	32.3	33.4
56	16.3	18.2	19.9	21.5	22.9	24.4	25.7	27.0	28.3	29.5	30.6	31.7	32.8	33.9
58	16.6	18.4	20.2	21.8	23.3	24.7	26.1	27.4	28.7	30.0	31.1	32.2	33.3	34.4
60	16.8	18.7	20.4	22.1	23.6	25.1	26.5	27.8	29.1	30.5	31.6	32.7	33.8	34.9



Taken on trip to Canada after the Cleveland convention. Left to right—Winston Johnson, Secretary, Louisville Sheet Metal Contractors' Association, Mrs. Johnson, mother of Secretary; Mrs. O. E. Hutchison, Miss Alien Hutchison, Miss Virginia Hutchison, Secretary of the National Ladies' Auxiliary.

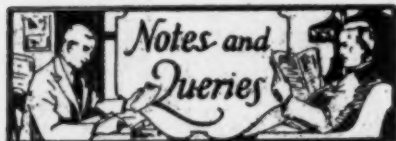
Left to Right—Dorothy Harpring, Treasurer "Go-Awa-Klub"; Mrs. William Mehler, Mrs. Charles Harpring, Miss Mary A. O'Leary, President, National Ladies' Auxiliary; Mrs. Ferd F. Schupp, Mrs. William Daschbach, taken at Niagara Falls after the Cleveland Convention.

#### Go-Wa Club Organized by Louisville Sheet Metal Ladies

The Louisville Ladies' Auxiliary are so enthused over the success of their last Go-Wa Club that they have organized their Club again this year. The first of their series of card parties at the members' homes was given at the home of Mrs. Wm. Fischer, according to Virginia Hutchison, reporter.

The second party will be given Saturday afternoon and evening, July 21, at the home of Mrs. Fannie Johnston. Because of the extreme summer heat, most of these parties will be given in the yards where one can play cards and enjoy the cool breezes.

Louisville is already planning their trip to Baltimore and it is rumored that some of the members have been invited to ride in an aeroplane to the next convention. Let's go.



#### Walter's and Cooper's Shingles

From E. L. Hyre, Saybrook, Illinois.

I would like to get in touch with a jobber in or about the vicinity of

Chicago carrying a stock of Walter's and Cooper's pressed metal shingles. Can you refer me to one?

Ans.—The manufacturers, National Sheet Metal Roofing Company, Jersey City, New Jersey, haven't a jobber in this vicinity and the shingles will have to be ordered direct.

#### "Martin" Traps for Cellar Drains

From Ossian Tin Shop, Ossian, Indiana.

Who makes "Martin" traps for cellar drains?

Ans.—Martin, Fort Wayne, Indiana.

#### "Sampson" Punch

From Vorys Brothers, Inc., 400 Dublin Avenue, Columbus, Ohio.

Can you tell us who makes the Sampson punch?

Ans.—Bates Manufacturing Company, Orange, New Jersey.

#### Oil Burning Refrigerator.

From Auburn Furnace Company, Auburn, Indiana.

Can you tell us who in Cleveland makes refrigerator or cooling unit using kerosene as fuel?

Ans.—Perfection Stove Company.

#### "Robertson" Ventilator.

From S. E. Smith Metal Company, Niagara Falls, New York.

Can you tell us who makes the Robertson ventilator?

Ans.—H. H. Robertson Company, Pittsburgh, Pennsylvania.

#### "Flintkote" Composition Shingles.

From Dale Brothers, 108 E. Conner Street, Live Oak, Florida.

We should like to know who makes "Flintkote" composition shingles.

Ans.—The Flintkote Company, 809 Park Square Bldg., Boston, Massachusetts.

#### "Reynolds" Furnace.

From E. E. Philpott, 205 West Center Street, Warsaw, Indiana.

Is the "Reynolds" furnace still being made and by whom?

Ans.—Yes, by B. F. Reynolds Company, 118 West Ohio Street, Chicago; also Reynolds Manufacturing Company, Springfield, Missouri.

#### "Novy" Ventilators.

From Dale Brothers, 108 East Conner Street, Live Oak, Florida.

Please advise us who makes the "Novy" Ventilators.

Ans.—Novy Ventilator Manufacturing Co., Muskogee, Oklahoma.

#### "Culter and Proctor" Furnace.

From C. Miller and Sons, 1115 Broadway, Fort Wayne, Indiana.

Who makes the Culter and Proctor furnace?

Ans.—Culter and Proctor Company, Peoria, Illinois.

#### Copper Wire Baskets.

From Friedley-Voshardt Company, 733 South Halsted Street, Chicago.

Can you tell us who makes copper wire baskets for dish washing machines?

Ans.—F. P. Smith Wire and Iron Works, 2346 Clybourn Avenue and Western Wire and Iron Works, 951 East 18th Place; both of Chicago.

#### "Storm King" Furnace.

From Dubuque Radiator Works, 1255 Central Avenue, Dubuque, Iowa.

Will you kindly advise who makes the "Storm King" furnace, as I want to get repairs for it.

Ans.—Union Stove Works, 70 Beekman Street, New York City, and Roberts-Hamilton Company, Minneapolis, Minnesota, both make a "Storm King" furnace, and can furnish you with repairs. You can secure firepots and grates also from the Northwestern Stove Repair Company, 654 West Roosevelt Road, Chicago.



# Steel Markets Unusually Active for Midsummer

*Production and Consumption Give No Ground—Prices Stable*

*Sheet Mills Continue Active—Pig Iron Weak at Chicago*

**M**IDSUMMER inertia will bear down upon iron and steel until Labor Day, but rarely has the industry entered this trying period so well fortified. It is noteworthy that consumption and production, striking a balance for all products, give ground exceedingly slowly in the face of vacations and other seasonal handicaps, and retain their lead over last year. In some of the light steel lines this is proving the best July in several years.

## Trend in Prices Toward Strength

Changes in the price situation the past week have been mainly on the side of strength. Pig iron, scrap and other raw materials are better in hand. Semi-finished steel is a shade stronger, with higher asking prices for the fourth quarter. Determination of producers of heavy finished steel to enforce advances this quarter is more marked and, at this season, evidences less relation to volume than to a desire to get on a more remunerative basis. Excepting possibly cold rolled strip, it is harder to duplicate recent low prices.

Hot weather is proving the usual hindrance to production and in some cases, notably at tin plate mills, resort is had to extra turns. Steel-making operations are little changed at Pittsburgh at about 70 per cent and are off 3 points at Chicago to 75 per cent. Buffalo, however, is up 2 points to 79 per cent, and in the Mahoning valley two more sheet mills bring operations in that branch up to 91 per cent, the highest of the year. Tin and strip mills are at capacity, and one more open hearth has been lighted. Steel corporation subsidiaries are operating this week at 75 per cent, an increase of 2 points over last week, and independents at 68 per cent, giving the entire industry an average of 70 per cent, fractionally higher than a week ago and about 3 per cent over a year ago.

## Pittsburgh Gains as Chicago Slips

A moderate upturn in demand for heavy steel, notably plates and bars, at Pittsburgh offsets a slight recession at Chicago. Bar specifications at Pittsburgh have rarely been so heavy late in July. As rapidly as customer relations permit, the mills are working heavy steel up to the basis of 1.90c, Pittsburgh. Especially in the East are contracts scarce and hand-to-mouth orders general.

Typifying the sheet situation, specifications to the leading producer last week were the second largest this year, and operations of this interest have been stepped up from 74 per cent last week to 81 per cent this week. All classes of users, headed by the automotive industry, are heavy takers for the season. Backlogs are not accumulating. Most orders are plied at 2.00c, Pittsburgh, for blue annealed, 2.65c for black, 3.50c for galvanized, and 4.00c for autobody. Tin plate mills, averaging 95 per cent, appear headed for a record year.

## Pig Iron

Pittsburgh pig iron sellers are booking small lots of foundry iron for regular customers at \$16.75, base, valley. Large tonnage buyers, however, have quotations from more than one source at \$16.50 base, valley.

Coverage of Chicago pig iron for third quarter is well advanced, and some estimates are that not more than 30 to 35 per cent remains open.

Preliminary estimates of pig iron sales for July indicate the total for the seven months' year will closely approximate the comparable period in 1926.

No change is noted in the Birmingham pig iron market. Furnace interests say sales will continue through the remainder of the year in small lots. The price continues \$15.50, base, Birmingham.

## Copper

Buying of this metal was extremely light the past week for domestic shipment, but producers believe that users in this country probably will begin to show more interest in their September requirements this week. The price remains unchanged and firm at 14.75c, Connecticut. Refineries are well caught up with shipping schedules but metal continues to be shipped out as rapidly as it comes from furnaces.

## Tin

This metal has fluctuated in a narrow range, mostly a little under 48.00c for spot, with more distant position ranging down to about 47.00 cents. About a week ago some good buying was done and the price jumped nearly 2.00 cents but fell back a little as soon as the buying let up.

## Zinc

Prime western metal has been quiet the past week with a little business from day to day for early shipment. Prices remain at 6.20 cents, East St. Louis, though there have been some rumors of shading.

## Lead

Buying of lead has been more active the past week. Most business has been for prompt shipment and the market now is firmer at the recently cut level. In fact there is some expectation that the East St. Louis price may go a little above 6.00 cents if buying continues active a few days longer.

## Old Metals

Wholesale quotations in the Chicago district, which should be considered as nominal, are as follows: Old steel axles, \$15.75 to \$16.25; old iron axles, \$24.00 to \$24.50; steel springs, \$15.50 to \$16.00; No. 1 wrought iron, \$11.00 to \$11.50; No. 1 cast, \$12.75 to \$13.25; all per net tons. Prices on non-ferrous metals are quoted as follows, per pound: Light copper, 10½ cents; zinc, 3¼ cents; cast aluminum, 12¼ cents.

# Chicago Warehouse Metal and Furnace Supply Prices

AMERICAN ARTISAN is the only publication containing Western Metal, Furnace Supply and Hardware prices corrected weekly

## METALS

### PIG IRON

Chicago Fdy..	\$17.50
No. 2	21 61
Southern Fdy. No. 2	27 04
Lake Superior Charcoal	17.50
Malleable	

### FIRST QUALITY BRIGHT TIN PLATES

IC 20x28 112 sheets	\$25 10
IX 20x28	29 60
IXX 20x28 56 sheets	16 20
IXXX 20x28	17 65
IXXXX 20x28	18 95

### TERNE PLATES

IC 20x28, 40-lb. 112 sheets	\$25 00
IX 20x28, 40-lb. 112 sheets	27 75
IX 20x28, 35-lb. 112 sheets	21 15
IX 20x28, 35-lb. 112 sheets	23 80
IC 20x28, 30-lb. 112 sheets	19 55
IV 20x28, 30-lb. 112 sheets	22 05
IC 20x28, 15-lb. 112 sheets	18 05

### "ARMCO" INGOT IRON PLATES

No. 8 ga. up to and including

1/4 in.—100 lbs. \$4 55

### COKE PLATES

Cokes, 80 lbs. base, 20x28	\$12 60
Cokes, 90 lbs. base, 20x28	13 50
Cokes, 100 lbs. base, 20x28	14 00
Cokes, 107 lbs. base, IC	14 30
Cokes, 105 lbs. base, IX	16 40
Cokes, 155 lbs. base, 56 sheets	9 20
Cokes, 175 lbs. base, 56 sheets	10 55
Cokes, 195 lbs. base, 56 sheets	10 90

### BLUE ANNEALED SHEETS

Base 10 ga. per 100 lbs.	\$3 35
"Armco" 10 ga. per 100 lbs.	4 00

### ONE PASS COLD ROLLED BLACK

No. 18-20 per 100 lbs.	\$3 75
No. 22 per 100 lbs.	3 90
No. 24 per 100 lbs.	3 80
No. 26 per 100 lbs.	4 00
No. 27 per 100 lbs.	4 10
No. 28 per 100 lbs.	4 20
No. 29 per 100 lbs.	4 25
No. 30 per 100 lbs.	4 45

### "ARMCO" GALVANIZED

"Armco" 24 per 100 lbs.	\$6 00
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### GALVANIZED

No. 18 per 100 lbs.	\$4 30
No. 18 per 100 lbs.	4 45
No. 20 per 100 lbs.	4 60
No. 22 per 100 lbs.	4 85
No. 24 per 100 lbs.	4 65
No. 26 per 100 lbs.	5 00
No. 27 per 100 lbs.	5 15
No. 28 per 100 lbs.	5 20
No. 30 per 100 lbs.	5 70

### BAR SOLDER

Warranted	
50-50 per 100 lbs.	\$30 50
Commercial	
45-55 per 100 lbs.	27 50
Plumbers per 100 lbs.	24 50

### ZINC

In Slabs	\$ 6 50
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### SHEET ZINC

Cask Lots (800 lbs.)	\$10 75
Sheet Lots	11 75

### BRASS

Sheets, Chicago Base	19 1/4c
Mill base	18 1/4c
Tubing, brazed base	27 1/4c
Wire, base	18 1/4c
Rods, base	16 1/4c

### COPPER

Sheets, Chicago base	24 1/4c
Mill base	23 1/4c
Tubing, seamless base	26 1/4c
Wire, No. 10, B & S Ga.	19 1/4c
Wire, No. 11 B & S Ga.	20 1/4c
Wire, No. 1, B & S Ga. and heavier	19c

## LEAD

American Pig	\$7 20
Bar	8 20

## TIN

Pig Tin per 100 lbs.	\$55 00
Bar Tin per 100 lbs.	56 00

## HARDWARE, SHEET METAL SUPPLIES, WARM AIR FURNACE FITTINGS AND ACCESSORIES.

### ASBESTOS

Paper up to 1/16	.6c per lb.
Roll board 3/32 to 1/2	.64c per lb.
Mill board 3/32 to 1/2	.6c per lb.
Corrugated Paper (250 sq. ft. to roll)	\$6 00 per roll

### BRUSHES

Furnace Pipe Cleaning	
Bristle, with handle, each	\$0 75

### Flue Cleaning

Steel only, each	1 25
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### BURRS

Copper Burrs only	40-2 1/4c
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### CEMENT, FURNACE

American Seal, 5-lb. cans, net	\$ 45
American Seal, 10-lb. cans, net	85
American Seal, 25-lb. cans, net	2 25
Pecora per 100 lbs.	7 50

### CHIMNEY TOPS

Adams' Revolving	
4 in. 21 lbs.	\$11 00
6 in. 24 lbs.	11 50
7 in. 30 lbs.	13 50
8 in. 33 lbs.	15 00
9 in. 51 lbs.	16 50
10 in. 56 lbs.	18 00
12 in. 66 lbs.	22 00
14 in. 110 lbs.	36 00

### CLINKER TONGS

Each	\$1 50
------	--------

### CLIPS

Damper	
No-Rivet Steel, with tail pieces, per gross	\$9 50
Rivet Steel, with tail pieces, per gross	7 50
Tail pieces, per gross	2 40

### COPPERS—Soldering

Pointed Roofing	
3 lb. and heavier	per lb. 48c
2 1/2 lb.	per lb. 45c
2 lb.	per lb. 45c
1 1/2 lb.	per lb. 55c
1 lb.	per lb. 60c

### CORNICE BRAKES

Chicago Steel Bending	
Nos. 1 to 6B	Net

### CUT-OFFS

Gal. plain, round or cor. rd.	
26 gauge	30%
28 gauge	35%

### DAMPERS

"Yankee" Hot Air	
7 inch, each 20c, doz.	\$1 60
8 inch, each 25c, doz.	2 20
9 inch, each 30c, doz.	2 60
10 inch, each 32c, doz.	2 80
Smoke Pipe	
7 inch, doz.	\$1 60
8 inch, doz.	2 00
9 inch, doz.	2 00
10 inch, doz.	2 75
12 inch, doz.	4 50

### ADAMS No. 1 CHECK

Check and Collar Complete	
3 inch, each	2 00
9 inch, each	2 25
End Check Only	
3 inch, each	1 60
9 inch, each	1 85

### Collar Only

3 inch, each	50
9 inch, each	65

### No. 2 CHECK

3 inch, each	1 00
9 inch, each	1 00
10% Disc. on Adams No. 1 and No. 2 Check	

### Diamond Smoke Pipe

7 inch, doz.	\$ 2 00
8 inch, doz.	3 20
9 inch, doz.	4 80
10 inch, doz.	6 00

## Adams' Sheet Metal

7 inch, doz.	\$ 1 60
8 inch, doz.	2 20
9 inch, doz.	2 60
10 inch, doz.	2 80
12 inch, doz.	3 50
14 inch, doz.	5 00

## EAVES TROUGH

Galv. Crimped, crated 75 & 5%	
Zinc, "Barnes"	.60%

## ELBOWS

Conductor Pipe	
Galv. plain or corrugated, round flat Crimp.	
28 Gauge	.60%
26 Gauge	.45%
24 Gauge	.15%

## Galv. & Terne Steel

Plain Rd. and Rd. Corr.	
28 Ga.	.60%
26 Ga.	.45%
24 Ga.	.15%

## Square Corrugated

No. 28 Gauge	.50%
26 Gauge	.35%

## Portico Elbows

Standard Gauge Conductor Pipe, plain or corrugated.	
Not nested	.70 & 5%
Nested Solid	.70 & 5%

## Sq. Corr., A. & B. & Octagon

28 Ga.	.50%
26 Ga.	.35%

## Portico

1", 1 1/4", 1 1/2"	.45%
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## Copper

16 oz., all designs	.50%
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## Zinc

All styles	.60%
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## ELBOWS—Stove Pipe

1-piece Corrugated, Uniform Blue "Milcor" No. 28 Gauge, Doz.	
6-inch	\$1 05
6-inch	1 20
7-inch	1 75

## Special Corrugated

6-inch	\$1 00
7-inch	1 60

## Adjustable—Uniform Blue

"Milcor" No. 28 Gauge, Uniform Blue.	
5-inch	\$1 65
6-inch	1 75
7-inch	2 10

## WOOD FACES—50% off list.

## FENCE

726-6-12 1/2% (100 rods)	\$28 88
1948-6-14 1/4% (100 rods)	43 62

## FILES AND RASPS

Heller's (American)	.50-10%
American	.60-10%
Arcade	.50%
Black Diamond	.50%
Eagle	.50%
Great Western	.50%
Kearney & Foot	.50%
McClellan	.50%
Nicholson	.50%
Simonds	.60%

## FIRE POTS

Geo. W. Diener Mfg. Co.	Pa.
No. 02 Gasoline Torch, 1 qt.	\$ 6 18
No. 0350, Kerosene, or Gasoline Torch, 1 qt.	6 50
No. 10 Tinner's Furn. Square tank, 1 gal.	11 20
No. 15 Tinner's Furn. Round tank, 1 gal.	10 70
No. 21 Gas Soldering Furnace	3 60
No. 110 Automatic Gas Soldering Furnace	10 50

## Quick Meal Stove Co.

Vesuvius, F. O. B. St. Louis 30% (Extra Disc. for large quantities.)	
----------------------------------------------------------------------	--

## GALVANIZED WARE

Pails (Galv. after made), 10-qt.	\$3 60
Tubs (Galv. after made), No. 1	5 75
No. 2	6 50

## GLASS

Single Strength, A. 52-in. brackets	.88%
Single Strength, 9, 34 to 40-in. brackets	.89-5%
Single Strength, A. all other brackets	.88%
Double Strength, A. all sizes	.88%

## HANGERS

Conductor Pipe	
Milcor Perfection Wire	.25%
Milcor Triplex Wire	.10%

## Eaves Trough

Milcor Steel (galv. after forming) List	plus 13 1/2%
Milcor Solid Rock E. T. Wire, List	plus 50%

## HOOKS

Conductor	
"Direct Drive" Wrought Iron for wood or brick	.16%

## HUMIDIFIERS

"Front-Rank," Automatic	
In single lots	.50%
In lots of 10 or more	.50-5%
In lots of 25 or more	.50-10%
Vapor pans, etc., each	.50%

## LIFTERS

Stove Cover	
Coppered	per gro. \$6 00
Alaska	per gro. 4 75

## MALLETS

Tinners Hickory	per doz. \$2 25
-----------------	-----------------

## MITRES

Galvanized steel mitres, 28 Ga.	.70
26 Ga.	.60-20

## NAILS

Cut Steel	\$4 35
Cut Iron	4 35

## Wire

Common	\$3 10
Cement Coated	3 10

(Continued on Page 158)



# No wonder Heye's customers are sold on ARMCO Ingot Iron



**S**EVENTEEN years ago Thomas Heye, contractor of St. Charles, Missouri, installed ARMCO Ingot Iron gutters on this residence.

Now, after all these years, Mr. Heye is enthusiastic over the long service that this, one of his first ARMCO Ingot Iron jobs, has rendered. He writes: "Customer Ed Bloeser is not only well satisfied with the material and workmanship but is firmly sold on ARMCO Ingot Iron, and feels that it is superior to all other sheet metals."

One satisfied customer makes for more. He talks, he recommends, he literally *sells* your services. Doubtless this feature, along with liberal use of Shop Helps, accounts for Contractor Heye's success.

You, too, can swell your income and make permanent customers out of prospects. An Ingot Iron Shop franchise, adherence to its sound principles, and diligent application of the free sales-getting helps will do it. Ask any of our salesmen to explain this profitable plan.



**ARMCO Distributors' Assn. of America**  
**Executive Offices: Middletown, Ohio**

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NETTING, POULTERY	
Galvanized before weaving. ....	60%
Galvanized after weaving. ....	60-10%

PASTE	
Asbestos Dry Paste:	
200-lb. Barrel. ....	\$16 00
100-lb. barrel. ....	8 75
35-lb. pail. ....	3 50
10-lb. bag. ....	1 10
5-lb. bag. ....	60
2½-lb. cartons. ....	35

POKERS, FURNACE	
Each. ....	\$0 75

POKERS, STOVE	
Nickel Plated, coil handles. ....	1 10
per doz. ....	—
Wrt Steel, str't or bent. ....	—
per doz. ....	\$0 75

PIPE	
Conductor	
Cor. Rd., Plain Rd., or Sq.	
Galvanized	
Crated and nested (all gauges). ....	75-2½%
Crated and not nested (all gauges). ....	70-15%

Furnace Pipe	
Double Wall Pipe and Fittings. ....	50%
Single Wall Pipe, Round. ....	—
Galvanized Pipe. ....	50%
Galvanized and Tin Fittings. ....	50%

Lead	
Per 100 lbs. ....	\$12 50

Stove Pipe	
"Milcor" "Titelock" Uniform Blue Stove	
28 gauge, 5 inch U. C. ....	10 50
28 gauge, 6 inch U. C. ....	11 00
28 gauge, 7 inch U. C. ....	12 00
30 gauge, 5 inch U. C. ....	9 00
30 gauge, 6 inch U. C. ....	10 00
30 gauge, 7 inch U. C. ....	12 00

T-Joint Made up	
6-inch, 38 ga. .... per doz. & 4 00	
All Zinc	
No. 11, all styles. ....	60%

FULLEYS	
Furnace Tackle. .... per doz. \$0 35	
..... per gro. \$ 50	
Furnace Screw (enameled). ....	75

PUTTY	
Commercial Putty, 100-lb. ....	—
Kits. ....	\$3 50

QUADRANTS	
Malleable Iron Damper. ....	10%

REDUCERS—Oval Stove Pipe	
Per Doz.	
7-8, 28-gauge, 1 doz. in carton. ....	\$2 00

REGISTERS AND BORDERS	
Baseboard, Floor and Wall.	
Cast Iron. ....	20%
Steel and Semi-Steel. ....	40%
Baseboard, 1 piece. ....	40-50%
Baseboard, 2 pieces. ....	40%
Wall. ....	40%
Adjustable Ceiling Ventilators. ....	40%

Register Faces—Cast and Steel	
Japanned, Bronzed and Plated, 4½ to 14x14. ....	40%
Large Register Faces—Cast. ....	—
14x14 to 38x42. ....	60%
Large Register Faces—Steel. ....	—
14x14 to 38x42. ....	65%
Ventilating Register	
Per gross. ....	\$ 00
Small, per pair. ....	20
Large, per pair. ....	50

RIDGE ROLL	
Galv., Plain Ridge Roll, b'd'd. ....	75-10-4%
Galv., Plain Ridge Roll crated. ....	75-10%
Globe Finales for Ridge Roll. ....	50%

SCREWS	
Sheet Metal	
7, ¼x¼, per gross. ....	\$0 52
No. 10, ¼x3/16, per gross. ....	63
No. 14, ¼x¼, per gross. ....	83

SHEARS, TINNERS' & MACHINISTS'	
Viking. ....	\$22 00

Lennox Throatless	
No. 18. ....	35%
Shear blades. ....	10%
(f. o. b. Marshalltown, Iowa)	

SHIELDS, REGISTER	
No. 1 "Gem" floor. ....	\$11 00 doz.
No. 2 "Gem" wall. ....	6 00 doz.

SHOES	
Galv. 28 Gauge, Plain or corrugated round flat crimp. ....	60%
36 gauge round flat crimp. ....	45%
24 gauge round flat crimp. ....	15%

SNIPS, TINNERS	
Clover Leaf. ....	40 & 10%
National. ....	40 & 10%
Star. ....	50%
Milcor. ....	Net

SQUARES	
Steel and Iron. ....	Net
(Add for bluing \$3 per doz. net)	
Mitre. ....	Net
Try. ....	Net
Try and Bevel. ....	Net
Try and Mitre. ....	Net
Fox's. .... per doz. \$6 00	
Winterbottom's. ....	10%

STOPPERS, FLUE	
Common. .... per doz. \$1 10	
Gem, No. 1. .... per doz. 1 10	
Gem, flat, No. 1. .... per doz. 1 00	

VENTILATORS	
Standard. ....	30 to 40%

WIRE	
Plain annealed wire, No. 8 per 100 lbs. ....	\$3 00
Galvanized barb wire, per 100 lbs. ....	\$ 90
Wire Cloth—black painted, 18-mesh, per 100 sq. ft. ....	1 35
Cattle Wire—galvanized catch weight spool, per 100 lbs. ....	\$ 80
Galvanized Hog Wire, 50 rod spool, per spool. ....	\$ 13
Galvanized Plain Wire, No. 9, per 100 lbs. ....	\$ 35
Stove Pipe, per stone. ....	1 10

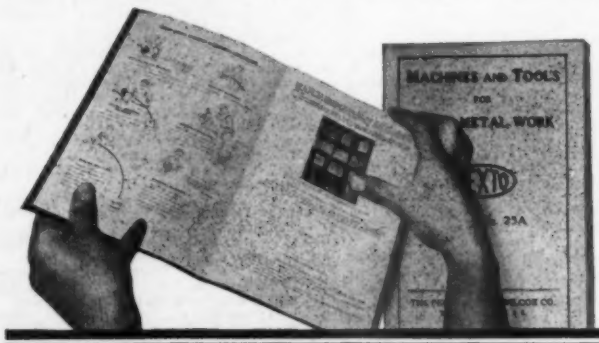
WRINGERS	
No. 700, Guarantee. .... each	\$5 10
No. 770, Bicycle. .... each	4 70
No. 670, Domestic. .... each	4 35
No. 110, Brighton. .... each	3 70
No. 750, Guarantee. .... each	5 10
No. 740, Bicycle. .... each	4 70
No. 32, Pioneer. .... each	3 40
No. 2, Superb. .... each	3 65



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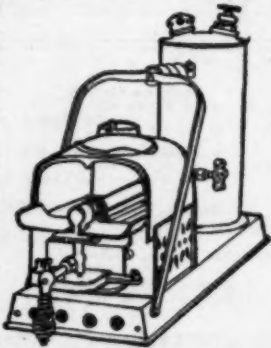
# BUYERS' DIRECTORY

- Asbestos—Liquid.**  
B. & F. Mfg. Co., Des Moines, Ia.
- Acetylene (Gas) Dissolved.**  
Frest-O-Lite Co., Inc., New York, N. Y.
- Air Filters.**  
Sturtevant Co., B. F., Boston, Mass.
- Bale Ties.**  
American Steel & Wire Co., Chicago, Ill.
- Bolts—Stove.**  
The Kirk-Latty Co., Cleveland, Ohio  
Lamson & Sessions Co., Cleveland, Ohio  
Ryerson & Son, Inc., Jos. T., Chicago, Ill.
- Brakes—Bending.**  
Dreis & Krump Mfg. Co., Chicago, Ill.  
Ryerson & Son, Inc., Chicago, Ill.
- Brakes—Cornice.**  
Dreis & Krump Mfg. Co., Chicago, Ill.
- Brass and Copper.**  
American Brass Co., Waterbury, Conn.  
Copper & Brass Research Association, New York
- Burners—Gas.**  
Wender-Worker Gas Appliances Co., Cincinnati, Ohio
- Cane—Garbage.**  
Osborn Co., The J. M. & L. A., Cleveland, Ohio
- Castings—Malleable.**  
Fanner Mfg. Co., Cleveland, Ohio
- Ceilings—Metal.**  
Burton Co., The W. J., Detroit, Mich.  
Friedley-Voshardt Co., Chicago, Ill.  
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City  
Wheeling Corrugating Co., Wheeling, W. Va.
- Chaplets.**  
Fanner Mfg. Co., Cleveland, Ohio
- Chimney Tops.**  
Standard Ventilator Co., Lewisburg, Pa.
- Clinker Tongs.**  
L. J. Mueller Furnace Co., Milwaukee, Wis.  
Stover Mfg. & Engine Co., Freeport, Ill.
- Copper.**  
American Brass Co., Waterbury, Conn.  
Copper & Brass Research Association, New York
- Cornices.**  
Friedley-Voshardt Co., Chicago, Ill.  
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City
- Cutting Blowpipes.**  
Oxweld Acetylene Co., New York, N. Y.
- Cut-offs—Rain Water.**  
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City
- Dampers—Quadrants—Accessories.**  
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L. J. Mueller Furnace Co., Milwaukee, Wis.  
Parker-Kalon Corp., New York, N. Y.  
Stover Mfg. & Engine Co., Freeport, Ill.
- Damper Regulators.**  
National Regular Co., Chicago, Ill.
- Disc—Punch & Press.**  
La Salle Machine Works, Chicago, Ill.
- Diffuser—Air Duct.**  
Aeolus-Dickinson Co., Chicago, Ill.
- Doors—Metal.**  
Lupton's Sons Co., David, Philadelphia, Pa.
- Drive Screws—Hardened Metallic.**  
Parker-Kalon Corp., 200 Varick St., New York
- Eaves Trough.**  
Barnes Metal Products Co., Chicago, Ill.
- Berger Bros. Co., Philadelphia, Pa.**  
Berger Co., L. D., Philadelphia, Pa.  
Burton Co., The W. J., Detroit, Mich.  
Lupton's Sons Co., David, Philadelphia, Pa.  
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City  
New Jersey Zinc Sales Co., The New York, N. Y.  
Wheeling Corrugating Co., Wheeling, W. Va.
- Elbows and Shoes—Conductor.**  
Barnes Metal Products Co., Chicago, Ill.  
Dieckmann Co., Ferdinand, Cincinnati, Ohio  
Lupton's Sons Co., David, Philadelphia, Pa.  
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City
- Wood Faces—Cold Air.**  
Auer Register Co., Cleveland, Ohio  
American Wood Register Co., Plymouth, Ind.  
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City
- Fences.**  
American Steel & Wire Co., Chicago, Ill.
- Fittings—Conductor.**  
Barnes Metal Products Co., Chicago, Ill.  
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City
- Flanges.**  
Chicago Metal Mfg. Co., Chicago, Ill.
- Fittings—Steel Pipe.**  
Chicago Metal Mfg. Co., Chicago, Ill.
- Flue Thimbles.**  
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City
- Furnace Cement—Asbestos.**  
Connors Paint Mfg. Co., Wm., Troy, N. Y.  
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City
- Furnace Cement—Liquid.**  
Technical Products Co., Pittsburgh, Pa.
- Furnace Cleaners—Suction.**  
Brillion Furnace Co., Brillion, Wis.  
Sturtevant Co., B. F., Boston, Mass.
- Furnace Coloring (Enamel).**  
B & F Mfg. Co., Des Moines, Iowa
- Furnace Fans.**  
A. H. Robinson Co., Massillon, Ohio  
Warm Air Furnace Fan Co., The Cleveland, Ohio
- Furnace Fuse.**  
National Regulator Co., Chicago, Ill.
- Furnace Regulators.**  
National Regulator Co., Chicago, Ill.
- Furnace Rings.**  
Forest City-Walworth Run Foundries Co., Cleveland, O.  
Milwaukee Corrugating Co., Milwaukee, Wis.
- Furnaces—Gas.**  
Mueller Furnace Co., L. J., Milwaukee, Wis.
- Furnaces—Warm Air.**  
Agricola Furnace Co., Gadsden, Ala.  
American Furnace Co., St. Louis, Mo.  
American Foundry & Furnace Co., Bloomington, Ill.  
Brillion Furnace Co., Brillion, Wis.  
Floral City Heater Co., Monroe, Mich.  
Forest City-Walworth Run Fdy. Co., Cleveland, Ohio  
Fox Furnace Co., Elyria, Ohio  
Henry Furnace & Fdy. Co., Cleveland, Ohio  
Hess-Snyder Co., Massillon, Ohio  
Homer Furnace Co., Coldwater, Mich.  
Langenberg Mfg. Co., St. Louis, Mo.  
Lennox Furnace Co., Marshalltown, Ia.; Syracuse, N. Y.
- May-Flebeiger Furnace Co., Newark, Ohio**  
Meyer Furnace Co., The Peoria, Ill.  
Moncrief Furnace Co., Atlanta, Ga.  
Mt. Vernon Furnace & Mfg. Co., Mt. Vernon, Ill.  
Mueller Furnace Co., L. J., Milwaukee, Wis.  
Richardson & Boynton Co., New York, N. Y.  
Robinson Co., A. H., Massillon, Ohio  
Rybolt Heater Co., Ashland, Ohio  
Standard Furnace & Supply Co., Omaha, Neb.  
Success Heater Mfg. Co., Des Moines, Iowa  
Thatcher Co., Chicago, Ill.  
XXth Century Heating & Ventilating Co., Akron, Ohio  
Waterman-Waterbury Co., Minneapolis, Minn.  
Western Steel Products Co., Duluth, Minn.  
Wise Furnace Co., Akron, Ohio
- Gas (Acetylene) Dissolved.**  
Frest-O-Lite Co., Inc., New York, N. Y.
- Gas (Nitrogen).**  
Linde Air Products Co., New York, N. Y.
- Gas (Oxygen).**  
Linde Air Products Co., New York, N. Y.
- Glass—Wire.**  
Lupton's Sons Co., David, Philadelphia, Pa.
- Grilles.**  
Auer Register Co., Cleveland, Ohio  
Harrington & King Perforating Co., Chicago, Ill.  
Hart & Cooley Co., New Britain, Conn.  
Independent Reg. Co., Cleveland, Ohio  
Tuttle & Bailey Mfg. Co., Chicago, Ill.
- Grilles—Store Front.**  
Tuttle & Bailey Mfg. Co., Chicago, Ill.
- Guards—Machine and Belt.**  
Harrington & King Perforating Co., Chicago, Ill.
- Handles—Boiler.**  
Berger Bros. Co., Philadelphia, Pa.
- Handles—Soldering Iron.**  
Hyro Mfg. Co., New York, N. Y.
- Hangers—Eaves Trough.**  
Berger Co., L. D., Philadelphia, Pa.  
Horan Stay Hanger Co., Louisville, Ky.  
Lupton's Sons Co., David, Philadelphia, Pa.  
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City
- Heat Regulation Systems.**  
National Regulator Co., Chicago, Ill.
- Heaters—Cabinet.**  
Fox Furnace Co., Elyria, Ohio  
Mueller Furnace Co., L. J., Milwaukee, Wis.  
Waterman-Waterbury Co., Minneapolis, Minn.
- Heaters—School Room.**  
Floral City Heater Co., Monroe, Mich.  
Meyer Furnace Co., The Peoria, Ill.  
L. J. Mueller Furnace Co., Milwaukee, Wis.  
Standard Furnace & Supply Co., Omaha, Neb.  
Waterman-Waterbury Co., Minneapolis, Minn.
- Hooks—Conductor.**  
Berger Co., L. D., Philadelphia, Pa.
- Hotels.**  
Fort Shelby Hotel, Detroit, Mich.
- Humidifiers.**  
Automatic Humidifier Co., Cedar Falls, Iowa  
L. J. Mueller Furnace Co., Milwaukee, Wis.
- Lath—Expanding Metal.**  
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City
- Machines—Crimping.**  
Bertsch & Co., Cambridge City, Ind.
- Machinery—Culvert.**  
Bertsch & Co., Cambridge City, Ind.
- Machines—Tinsmith's.**  
Bertsch & Co., Cambridge City, Ind.  
Burton Co., The W. J., Detroit, Mich.  
Dreis & Krump Mfg. Co., Chicago, Ill.  
Interstate Machinery Co., Chicago, Ill.  
La Salle Machine Works, Chicago, Ill.  
Marshalltown Mfg. Co., Marshalltown, Iowa  
Osborn Co., The J. M. & L. A., Cleveland, Ohio  
Peck, Stow & Wilcox Co., Southington, Conn.  
Ryerson & Son, Inc., Jos. T., Chicago, Ill.  
Whitney Mfg. Co., W. A., Rockford, Ill.
- Mandrels.**  
Hyro Mfg. Co., New York, N. Y.
- Metals—Perforated.**  
Harrington & King Perforating Co., Chicago, Ill.
- Miters.**  
Friedley-Voshardt Co., Chicago, Ill.  
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City
- Miters—Eaves Trough.**  
Barnes Metal Products Co., Chicago, Ill.  
Lupton's Sons Co., David, Philadelphia, Pa.
- Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City**
- Nails—Hardened Masonry.**  
Parker-Kalon Corp., New York, N. Y.
- Nails—Wire.**  
American Steel & Wire Co., Chicago, Ill.
- Nitrogen (Gas).**  
Linde Air Products Co., New York, N. Y.
- Oil Burners.**  
McIlvaine Burner Corp., Evanston, Ill.
- Ornaments—Sheet Metal.**  
Friedley-Voshardt Co., Chicago, Ill.
- Gerock Bros. Mfg. Co., St. Louis, Mo.**  
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City
- Oxygen (Gas).**  
Linde Air Products Co., New York, N. Y.
- Paint.**  
Connors Paint Mfg. Co., Wm., Troy, N. Y.
- Patterns—Furnace and Stove.**  
Cleveland Castings Pattern Co., Cleveland, Ohio  
Quincy Pattern Co., Quincy, Ill.  
Vedder Pattern Works, Troy, N. Y.
- Pipe and Fittings—Furnace.**  
Burton Co., The W. J., Detroit, Mich.  
Henry Furnace & Fdy. Co., Cleveland, Ohio  
Lamneck Co., W. E., Columbus, Ohio  
Meyer & Bro. Co., F., Peoria, Ill.  
Milwaukee Corrugating Co., Mil., Ch'go, La Crosse, Kan. City  
Mueller Furnace Co., L. J., Milwaukee, Wis.  
Osborn Co., The J. M. & L. A., Cleveland, Ohio  
Standard Furnace & Supply Co., Omaha, Neb.

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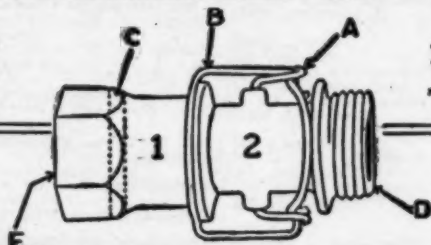
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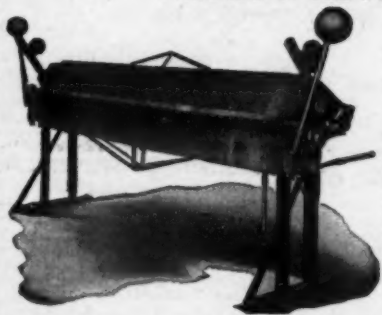
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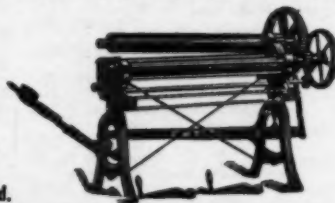
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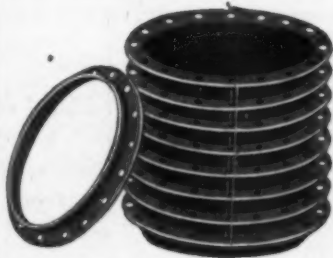
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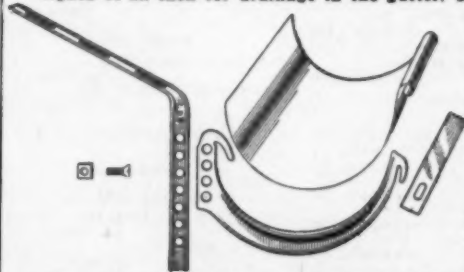
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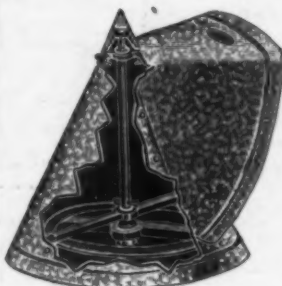
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Chicago, Ill.  
Dieckmann Co., Ferdinand,  
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Friedley-Voshardt Co.,  
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Lupton's Sons Co., David,  
Philadelphia, Pa.  
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New Jersey Zinc Sales Co., The  
New York, N. Y.  
Wheeling Corrugating Co.,  
Wheeling, W. Va.

**Posts—Steel Fence.**  
American Steel & Wire Co.,  
Chicago, Ill.

**Presses.**  
La Salle Machine Works,  
Chicago, Ill.

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Interstate Machinery Co.,  
Chicago, Ill.  
La Salle Machine Works,  
Chicago, Ill.  
Peck, Stow & Wilcox Co.,  
Southington, Conn.  
Ryerson & Son, Inc., Jos. T.,  
Chicago, Ill.  
Whitney Mfg. Co., W. A.,  
Rockford, Ill.

**Punches—Combination Bench and Hand.**  
Hyro Mfg. Co., New York, N. Y.  
Ryerson & Son, Inc., Jos. T.,  
Chicago, Ill.  
Whitney Mfg. Co., W. A.,  
Rockford, Ill.

**Punches—Hand.**  
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Whitney Mfg. Co., W. A.,  
Rockford, Ill.

**Patty—Stove.**  
Connors Paint Mfg. Co., Wm.,  
Troy, N. Y.

**Radiator Cabinets.**  
The Hart & Cooley Co.,  
New Britain, Conn.  
Tuttle & Bailey Mfg. Co.,  
Chicago, Ill.

**Radiators—Shields.**  
Beh & Co., Inc., New York, N. Y.

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Quick Meal Stove Co.,  
St. Louis, Mo.  
Thatcher Co.,  
Newark, N. J.

**Ranges—Gas.**  
Quick Meal Stove Co.,  
St. Louis, Mo.

**Register Shields.**  
Beh & Co., Inc., New York, N. Y.

**Registers—Warm Air.**  
Auer Register Co., Cleveland, Ohio  
Forest City-Walworth Run  
Foundries Co., Cleveland, O.  
Hart & Cooley Co.,  
New Britain, Conn.  
Henry Furnace & Fdy. Co.,  
Cleveland, Ohio  
Lamneck & Co., W. E.,  
Columbus, Ohio  
Meyer & Bro. Co., F. Peoria, Ill.  
Milwaukee Corrugating Co.,  
Mil., Ch'go, La Crosse, Kan. City  
Mueller Furnace Co., L. J.,  
Milwaukee, Wis.  
Stearns Register Co.,  
Detroit, Mich.  
Standard Furnace & Supply Co.,  
Omaha, Neb.  
Tuttle & Bailey Mfg. Co.,  
Chicago, Ill.

**Registers—Wood.**  
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Plymouth, Ind.  
Auer Register Co., Cleveland, Ohio  
Milwaukee Corrugating Co.,  
Mil., Ch'go, La Crosse, Kan. City  
L. J. Mueller Furnace Co.,  
Milwaukee, Wis.

**Repairs—Stove and Furnace.**  
Hessler Co., H. E.,  
Syracuse, N. Y.

**Ridging.**  
Armco Distributors Ass'n of  
America, Middletown, Ohio  
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Philadelphia, Pa.  
Milwaukee Corrugating Co.,  
Mil., Ch'go, La Crosse, Kan. City

**Rivets—Stove.**  
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Cleveland, Ohio  
Lamson & Sessions Co.,  
Cleveland, Ohio  
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Chicago, Ill.

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Cleveland, Ohio  
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Bertsch & Co.,  
Cambridge City, Ind.

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Connors Paint Mfg. Co., Wm.,  
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Pecora Paint Co.,  
Philadelphia, Pa.

**Roof—Flashing.**  
Hessler Co., H. E., Syracuse, N. Y.  
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**Roofing—Iron and Steel.**  
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Friedley-Voshardt Co.,  
Chicago, Ill.  
Inland Steel Co.,  
Chicago, Ill.  
Milwaukee Corrugating Co.,  
Mil., Ch'go, La Crosse, Kan. City  
Osborn Co., The J. M. & L. A.,  
Cleveland, Ohio  
Ryerson & Son, Inc., Jos. T.,  
Chicago, Ill.  
Wheeling Corrugating Co.,  
Wheeling, W. Va.

**Roofing—Tin.**  
Milwaukee Corrugating Co.,  
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Taylor Co., N. & G.,  
Philadelphia, Pa.  
Wheeling Corrugating Co.,  
Wheeling, W. Va.

**Roofing Tools.**  
Wm. Biermann, Brooklyn, N. Y.

**Roofing—Zinc.**  
New Jersey Zinc Sales Co., The,  
New York, N. Y.

**Rubbish Burners.**  
Hart & Cooley Co.,  
New Britain, Conn.

**Schools—Sheet Metal Pattern Drafting.**  
St. Louis Technical Institute,  
St. Louis, Mo.

**Schools—Warm Air Heating.**  
St. Louis Technical Institute,  
St. Louis, Mo.

**Screws—Hardened Metallic Drive.**  
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Mil., Ch'go, La Crosse, Kan. City  
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200 Varick St., New York

**Screws—Hardened Self-Tapping, Sheet Metal.**

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Co.,  
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**Shears—Hand and Power.**  
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Chicago, Ill.  
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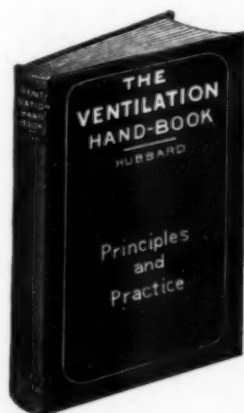
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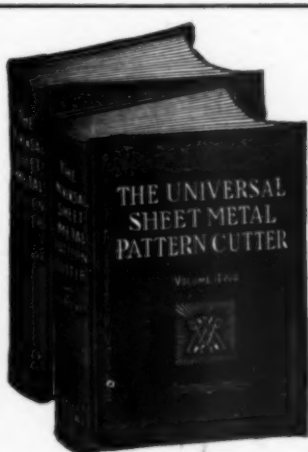
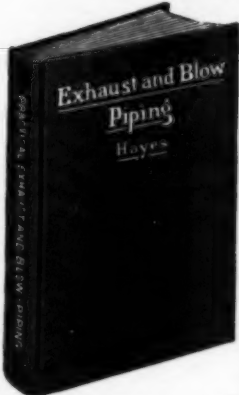
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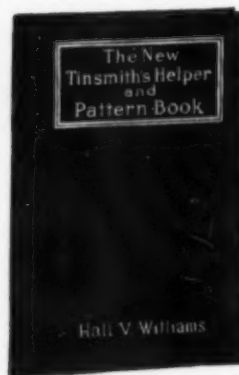
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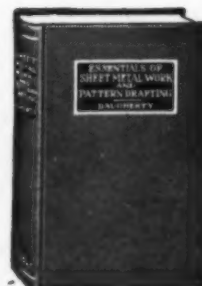
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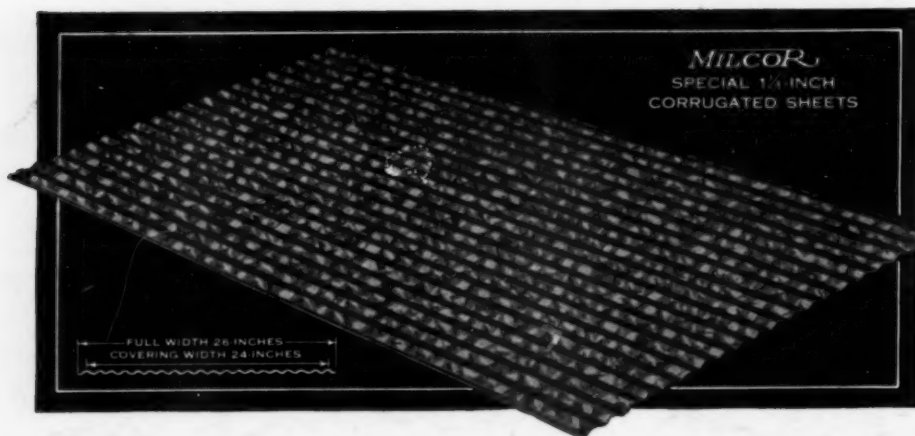
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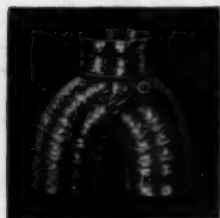


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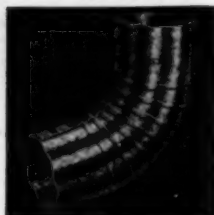
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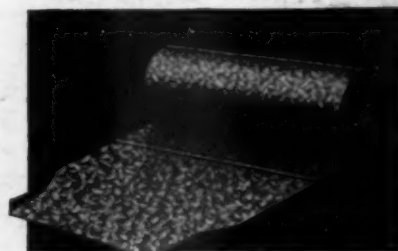
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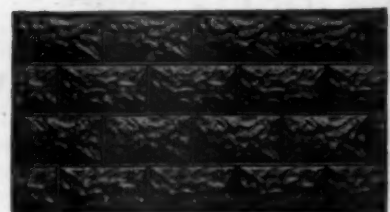
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